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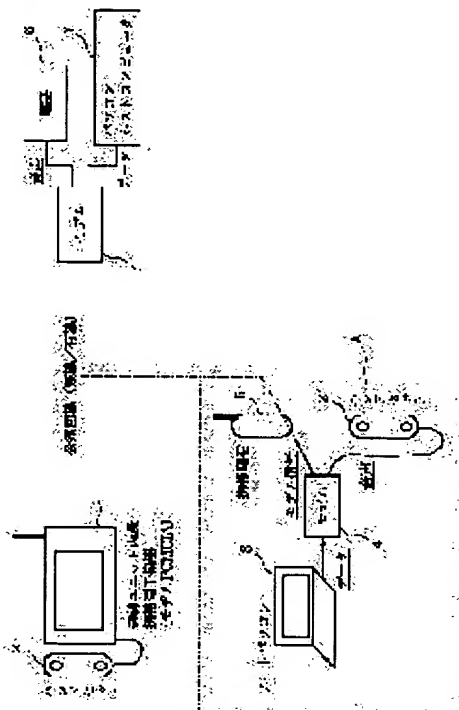
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(54) COMMUNICATION EQUIPMENT AND COMMUNICATION METHOD

(57)Abstract:

PURPOSE: To revise data automatically when data and voice are sent simultaneously by informing a data transmission reception state by a data transfer means to the user.

CONSTITUTION: A portable electronic equipment 1 incorporates a radio telephone function and the telephone set function is used by pointing out a software ten- key or a number of an address displayed on a screen and a voice signal is sent/received through a handset 2. The electronic device may be an existing notebook type personal computer 3 not incorporating a radio telephone set function. In this case, a MODEM 4 is loaded to a PCMCIA interface provided to the electronic device 3. A portable telephone set 5 is a general portable radio telephone set and able to transfer data through a radio channel by being connected to the MODEM 4. Then the data transmission reception state is informed to the user making voice communication.



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CLAIMS

[Claim(s)]

[Claim 1] The communication device characterized by having an information means to report the transceiver state of data according voice and data to the data transfer means in which simultaneous transmission and reception is possible, and the aforementioned data transfer means to the user who is performing the voice telephone call by the aforementioned data transfer means.

[Claim 2] Furthermore, it is the communication device of the claim 1 characterized by having a means to forbid the new call origination by the aforementioned user while transmitting and receiving the data based on the aforementioned data transfer means.

[Claim 3] The communication device characterized by having a judgment means to judge that telephone call voice was completed before communication of data ended telephone call voice and data simultaneously by the data transfer means and the aforementioned data transfer means which can be transmitted and received, and a generating means to generate the sound signal about a telephone call end according to the judgment of the aforementioned judgment means.

[Claim 4] The communication device carried out [having a judgment means to judge that telephone call start directions new before the telephone call with the specific partner by the data transfer means and the aforementioned data transfer means which can be transmitted and received ends telephone call voice and data through a circuit simultaneously and communication of data is completed occurred, and the control means which perform predetermined line control according to the judgment of the aforementioned judgment means, and] as the feature.

[Claim 5] The communication device of the claim 4 characterized by interrupting communication of the aforementioned data with the aforementioned predetermined line control, and cutting the circuit between the aforementioned specific partners.

[Claim 6] The communication device of the claim 4 characterized by reporting to a user that it is the aforementioned predetermined line control that new it cannot be talked over the telephone while holding the circuit between the aforementioned specific partners until communication of the aforementioned data is completed.

[Claim 7] The correspondence procedure characterized by facing [communicating using the data transfer means which can be transmitted and received simultaneously, and] voice and data, and reporting the transceiver state of the data based on this data transfer means to the user who is performing the voice telephone call by this data transfer means.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the communication device and correspondence procedure which communicate using a data transfer means by which voice and data can be transmitted simultaneously.

[0002]

[Description of the Prior Art] In recent years, by the miniaturization of computers including a notebook computer, and electronic processing of the stock control by the POS system etc., or cut-form processing, during the time of operating activities (going out), a notebook computer and an exclusive handy terminal are used and the information in a company can be accessed now through a circuit. Consequently, information settlement at the visitor point and the inventory check became easy, and the prompt action was attained.

[0003] That the environment which can be used with the individual base by the highly efficient miniaturization of the aforementioned electronic equipment and low-pricing was ready, and expansion of the service area of a wireless telephone and expansion of the radius of action of the information by low-pricing are also added to this background.

[0004] Moreover, the conventional modem (data, FAX) has applied the modulation, in order to transmit digital data to the analog telephone line which transmits voice, and the usual voice telephone call was not completed at the time of data transfer. However, when the same modem is used on both sides, the modem which can transmit voice and data (data, FAX) simultaneously by the technique of time sharing or a double carrier also came to be developed recently.

[0005]

[Problem(s) to be Solved by the Invention] However, when using the modem with which only data are sent, there was no way for which a user knows the state of transmitting data, performing the telephone call with voice, even if it used simultaneously the modem which can be transmitted for the aforementioned data and voice of course. Therefore, it was not user-friendly. Moreover, when voice telephone call and data communication were being simultaneously performed for the another purpose, the case where the advance situation of each communication was mutually contradictory arose.

[0006] this invention aims at offering the communication device and correspondence procedure which raised user-friendliness in view of this point.

[0007]

[Means for Solving the Problem] If it depends on invention of the 1st of this application in order to attain this purpose, it has an information means to report the transceiver state of data according voice and data to the data transfer means in which simultaneous transmission and reception is possible, and the aforementioned data transfer means to the user who is performing the voice telephone call by the aforementioned data transfer means.

[0008]

[Function] The transceiver state of the data based on the aforementioned data transfer means is reported to a user by the aforementioned information means.

[0009]

[Example] First, the schematic diagram of transmission and reception of the data in the public line by which the communication device of one example of this invention is used for drawing 1 is shown. 1 builds in the wireless telephone function by pocket electronic equipment (drawing is a pen computer). It can be used by directing as a telephone the number of the soft ten key displayed on a screen, or an address book, and voice is exchanged with an operator through the hand set of 2. The existing notebook computer 3 which does not build in the wireless telephone is also easy to be natural [electronic equipment]. In this case, the PCMCIA interface which the electronic equipment 3 has is equipped with a modem 4. Data transfer can also perform a cellular phone 5 on radio by connecting with a modem 4 by the general portable radiotelephone. The modem 4 as a data transfer means of this example can transmit voice and data simultaneously.

[0010] Therefore, with the equipment of this example, voice is also transmitted through a modem 4, namely, it is changed into digital data, and becomes irregular with a modem 4, and speech information is outputted to a circuit. Reception operation serves as the reverse.

[0011] Two kinds of this pocket electronic equipment is used at a going-out place, and it is fixed places, such as in the company, and a personal computer or a host computer 7 is the machine which can manage the schedule of an order cut-form, an inventory situation, and an individual, and, similarly is tied with the public line by the modem 4. A telephone 6 is an ordinary telephone usually used on business. A wireless telephone or connection of a cable comrade is sufficient as a public line. Although pocket

electronic equipment was illustrated as a going-out place in this example, fixed machine comrades, such as a desktop machine of a branch and a host computer of a head office, are also easy to be natural.

[0012] Drawing 2 is the outline block diagram showing the composition of the block shown as A of the aforementioned pocket electronic equipment 1 and drawing 1. These both composition is almost the same except for the kind of for example, CPU device being different.

[0013] A keyboard is a standard, if RAM and 11 are input devices, ROM and 12 are pen computers and CPU to which 8 performs control of this electronic equipment 1 or A in drawing 2, circumference I/O on which, as for 9, the CPU circumferences, such as a memory controller, were accumulated, and 10 are a digitizer and a notebook computer. 13 may be VGA of a display controller and liquid crystal or CRT is sufficient as display 14. 15 is the hard disk in which a lot of program and user data are stored, 16 is the interface (PCMCIA) of the IC card which came to be attached to small electronic equipment as standard, and this is equipped also with the modem 4. Of course, it is not the card of such a description formula and you may build. the radio unit 17 -- the plan of a wireless telephone -- following -- an electric wave -- transmitting and receiving. Line control 18 performs control about a circuit, such as telling a non-complex of lines through a radio unit by operation for raising the operation for telephoning, i.e., a hand set, and considering as an off-hook state. The hook control section 20 tells the line connection demand or disconnect request from CPU to line control 18. In fact, the hook state of a hand set is performed, once it judges the whole state by CPU. Even if a user changes into an on-hook state by this so that it may mention later, data transfer is continued as it is. With the sound signal generating means 19, when one side makes a hand set on hook among the communications partners of the both sides which are talking over the telephone, the dial tone at the time of cutting which shows a telephone call end to the communications partner of another side is changed to the exchange, it is made to generate in false or a Dial Tone Multi Frequency is generated. 21 is I/F for connecting with a circuit of a cable like RJ11.

[0014] Drawing 3 shows the diagram showing in what procedure data communication and voice conversation are actually held in the system indicated by this example. Whichever is sufficient as whether a transmitting side and a receiving side are in a going-out place or a company, respectively. The data which should update this example only by the transmitting side shall exist.

[0015] First, a transmitting person raises a hand set 2 or 2', or changes into an "on-hook" state by the hook icon on a screen (not shown). The circuit between the exchanges is opened by it and the exchange returns the dial tone which received that by it. If it can be checked, according to the software with which the electronic equipment itself was decided beforehand, a user will dial automatically. It collates whether CPU8 in a system is in agreement with that into which it is acting as the monitor of the dial, and the dial number was beforehand registered at this time. The dial number registered beforehand is a number of the terminal which has the modem which can send voice and data simultaneously as the other party.

[0016] If it can check that it is in agreement, since the data which should be equipped with the modem with which a partner can send voice and data simultaneously, and should be sent to a partner to both sides may exist, Irrespective of what thing if there is a partner's response, an audio conversation will be By using the channel for transmitting the function of the modem which can transmit and receive voice and data simultaneously, and data, i.e., the channel of the background, a data communication packet is sent by mutual and mutual ID (identification information) is checked mutually. When data to send on one side or both sides exist, it sends by making it a packet by the data unit, and a receiving side will return ACK each time, if it is easy to perform error checking.

[0017] A start of data communication reports that to a user. An information means may take out "the inside of data transfer" to display 14, or may be simple. [of Light Emitting Diode (not shown) etc.] If data are sent from a transmitting side, it finishes sending all and data are next in a receiving side, it will be sent conversely (not shown in drawing 3).

[0018] Since these data exchanges advance regardless of a voice telephone call and it is made for the situation not to affect a user's conversation or action, as soon as the business in voice ends, a user will operate an on-hook state or the hook icon of a screen for a hand set, and will hang up a telephone.

[0019] However, if data transfer was the middle, line control 18 will keep a circuit connected succeedingly. In order for the partner of a voice telephone call to make it both recognize to have cut the telephone with one side, a cutting tone is emitted by the sound signal generating means 19. A circuit is cut in the place to which data continued being similarly sent and it was altogether sent on both sides also at this time, without a user being conscious.

[0020] Since it connects, since it is the same, the circuit may be performing accounting by continuing a voice telephone call conversely for the user. Then, if it turns out for which data transfer is still performed, another talk can also be carried out according to it. The user displays the "remaining time" with "under the transfer" so that the remaining time can be known at any time. of course, a user -- it may respond for asking and you may display

[0021] The flow chart for realizing the aforementioned diagram to drawing 4 (a) and (b) is shown. First, it is shown what procedure drawing 4 is, when data are updated by the example in the case where the function of a scheduler is given to the system of this example.

[0022] (a) shows the case where a check or an appointment is put in for the schedule of the owner of a pocket device by communication to a personal computer 7 side. Data are received, first (4-1), the message which received (4-2) performs a command interpretation for for what it is asking (here, a check and appointment (4-5) of a schedule (4-3) were put in, and ** was mentioned as the example), and if a command is the check of a schedule, the schedule data on a personal computer (4-4) 7 is returned. Moreover, if it is putting in an appointment and the schedule is vacant, the flag which shows that it registers as a spurious data (4-6), and the data updated (4-7) exist is built, and the pointer of the place which uses as a table how many affairs for there to be in the unit of updating (4-8) data, and exists is stored.

[0023] (b) shows the flow in in any a user registers a new schedule also by the personal computer or pocket electronic

equipment, and the case of correcting. In this case, (4-9) it is put into new data at a going-out place with the personal digital assistant with which (4-10) is performed, and if temporary data registration is performed by the personal computer, both sides can do conflict, and the need of taking adjustment comes out.

[0024] Drawing 4 (c) is the example of the updating data table in a personal computer or the pocket electronic equipment 1, and makes the pointer and communication record (the communication start, discontinuation) which show a number (the order of a receptionist), the kinds (a schedule, FAX, order, etc.) of data, a date and time, the capacity of data, and the memory in which data are actually stored to one data. If more than one exist, the **** table exists.

[0025] Next, by drawing 5 (a), when the data which should be updated as shown in drawing 4 (c) exist, the flow chart of the data communication performed in parallel to the voice telephone call of the side to telephone is shown. A personal computer 3, the pocket machine 1, or whichever is sufficient as this.

[0026] (5-1) It is dialed by specifying the partner who connects, dials or applies a circuit so that a user may telephone ordinarily, as mentioned above. (5-2) It checks whether it is that into which the applied dial is registered beforehand. If it is numbers other than registration, it will suppose that it is an audio telephone call, and nothing will be carried out as data communication below (5-3).

[0027] (5-4) Permit a modem 4 at the time of the registered number, it equips data transfer with it, and waits for a partner's (5-5) response. Although not illustrated, when a partner is neither at during the conversation nor a telephone, since a user turns on a hand set and gives up a telephone call, he also interrupts this flow.

[0028] (5-6) Transmit your ID as data in parallel to an audio conversation by a partner's response. And waiting and ID which came (5-8) are collated for the answer of ID from a partner (5-7), and it judges whether it is normal (5-9). When neither the case where there is no answer of ID more than fixed time, nor ID suits from a partner, it becomes correspondence of only a voice telephone call.

[0029] In this case, it is not necessary to communicate through a modem 4.

[0030] (5-10) Check whether the updating data flag shown in the side telephoned next at drawing 4 (c) has left. If it is (5-11), according to the turn of having been put in by the data table, it will packet-size and will send. (5-25) Transmit mutually the capacity of the data which should next be sent on both sides, and calculate time required for data transfer. The capacity of data is the sum of the capacity sent by its sum total and partner of a data table. And while sending the message of a "data communication start" to a display, the communicative remaining time is displayed at any time. (5-12) Check that data have been safely transmitted by the ACK message from a partner, and delete from a table the data which it finished sending (5-13) each time. And it checks whether all data have finish sending by (5-14), otherwise, (5-11) returns, and the following packet is sent.

[0031] After all ending (5-15), the flag which shows existence of the data which should be updated is lowered.

[0032] When there are no data from the first, and when finishing sending, a message without data (5-16) is sent, and it waits for the answer from a partner (5-17). (5-18) If there is a partner, data will be received conversely, and if there is nothing, transmission and reception of data will be ended there. In (5-19), the situation of a voice telephone call is investigated, and still, when busy, it is made a voice talk state. Already, it ends and conversation cuts a circuit now, if a hand set is an ON state (5-20).

[0033] Processing of (5-25) is shown in drawing 7 (a) in detail here. The sum total of the capacity of the data which a data table should transmit by (17-1) is calculated. And this data is transmitted to a partner (17-2), next a partner's (17-3) data are received (17-4), and it totals with its amount of data. (17-5) Add experientially the time which procedure takes in quest of the real transfer time at it from data capacity and a transfer rate, and consider as required time. (17-6) "Under communication" and "required time" are taken out to the display means 14. Drawing 17 (b) shows the flow chart about amendment of the required time after a display start. Although 1-second interruption is used for the purpose with various systems, it explains only this portion. (17-7) If it has not come to judge whether the time currently displayed was made downed for 1 second (17-8), and it had been 0 second and has judged whether communication will actually be completed further (17-9) as it is if the end is come (17-10), turn off the display under communication. (17-11) Since the time error has arisen in the actual telephone call if communication is not completed, reset up time again from progress of the present communication.

[0034] (b) of drawing 5 describes the check of the telephone number [being shown in (a) of drawing 5 (5-2)] in more detail. The telephone number is, or it is set up how, and it is divided into the two modes. The 1st inputs the soft ten key which appeared in the display screen by electronic equipment 1 by the case where the telephone number is put in with direct (5-21) hand control by pushing with a pen. Moreover, a keyboard and a ten key are pushed in a general notebook computer. Since this is the input device of electronic equipment, it can grasp the number pushed in soft. (5-22) Memorize the number one by one. The 2nd calls the number which does not push direct keys, such as an address book, a telephone directory, an abbreviation dial, etc. in electronic equipment, but is memorized beforehand by the related key (5-23). At this time, shortly after being directed by the user, the target number is known. The telephone number of the these-inputted object compares whether it is in agreement with the number for [which is registered beforehand] transmission. In addition, existence, such as area code, shall be guessed at this time.

[0035] The flows of control of the side in which drawing 5 received the telephone by drawing 6 to the flows of control of the device of the telephoned side having been shown are shown.

[0036] Since there is also the same portion fundamentally, only difference is explained. First, the bell of a telephone rings and someone answers. Since there is nothing from someone or the cut matte, it waits whether to transmit any information data from a data side here (6-3). If there is no fixed time, after judging that it is from the ordinary telephone which does not have the broadcast function of voice data, it is made a voice telephone call. ID is sent, if it is suitable, a partner's data will be received first and, next, the data here will be sent (since other details are the same as drawing 5, explanation is omitted).

[0037] Next, drawing 7 shows interruption processing when voice conversation is completed. When a user shows the end volition of voice conversation clearly, it is constituted so that interruption may occur and the flow of drawing 7 is performed -- a hand set becomes or directs a hook icon to an ON state.

[0038] In this service routine, it checks whether data transfer is performed succeeding first (7-1), and if it continues, a circuit will generate a cutting tone with which it leaves as it is and ***** cut the telephone from the circuit here (7-2). It observes whether a partner cuts according to it (7-3), and (does it become on hook?) generating of a tone will be ended, if it becomes on hook and goes out (7-4). Moreover, if data transfer is completed even if a partner is not on hook, a flow will branch to (7-1) and a circuit will be cut as it is (7-5).

[0039] The example of the display screen is shown in drawing 18. As one of the windows, required communication time is displayed the inside of data transfer. In addition, what is necessary is to click the icon of discontinuation or just to touch with a pen to interrupt communication. Operation when discontinuation is directed is shown in drawing 19.

[0040] (19-1) Send out a discontinuation message instead of data transfer, and wait for a partner's (19-2) consent. And (19-3) it judges whether it is [be / it] under telephone call now in ON/OFF of a hand set, and if it is a telephone call end (19-4), a circuit is cut. Next, the data sent to the middle are processed. (19-5) Judge [which had sent data or ACK here at the time of discontinuation / or or] first whether reception was carried out, if it is transmission (19-6), see data or ACK further, if it is data, put a discontinuation message into communication record of a data table, and end (19-7). (19-8) If it is [ACK / be / it] under transmission, discard the data packet received now. By the receiving side, data or ACK is judged and it processes similarly (19-9) (19-10).

[0041] Furthermore, in spite of having reported the inside of data transfer, when a user once raises a hand set again after closing a telephone call and shows the volition of a telephone call start, while displaying warning as shown in drawing 20, it is made not to put into the next telephone call operation. A user can go into the next telephone call by waiting until data communication is completed, or terminating communication with directions of the aforementioned discontinuation.

[0042] (Example 2) In the aforementioned example, the message indicator to the display means 14 was used as an information means to a user.

[0043] this example shows the example reported in voice using the sound signal generating means 19.

[0044] Drawing 21 is the flow chart of the modification of drawing 17, and explains only difference. (21-6) When data transfer was started, the usual voice conversation was overlapped and "data communication was started. Time is 3 minutes. The message " is sent from the sound signal generating means 19. Moreover, you may make a user recognize by passing tone quality decided beforehand, such as a buzzer and a chime. (21-10) Pass the tone quality which reported "having ended data communication" with voice similarly at the time of a communication end, or was decided. The time (12 (21-11)-6) of producing change at communication time reports the time after change.

[0045] Furthermore, the time of a user once raising a hand set again after closing a telephone call, and showing the volition of a telephone call start, in spite of having reported the inside of data transfer, "data transfer is not completed. Please wait the back for 1 minute. A user is told about messages, such as ", from a hand set with voice.

[0046] Although a display and voice were raised as another example, you may perform information which compounded a display and voice.

[0047] As explained above, even when having depended on this example, data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, a voice telephone call can be effectively used now a lot time by reporting the situation of data communication.

[0048] Furthermore, before data were transmitted yet, when it was going to go into the next telephone call action, the warning message was able to be emitted, and the accuracy of data transfer was able to be raised.

[0049] As mentioned above, the modem which can send voice and data simultaneously was used, and when the data which should be updated mutually existed, the example which a user reports to a user that data are on the occasion of exchange in the background of the telephone usually telephone was shown.

[0050] (Modification 1) In the aforementioned example, the comparison test of them was carried out by registering the name interlocked with acting as the monitor of the number pushed as a judgment means to judge whether a communications partner is a specific partner, with the push button and soft ten key (screen for a telephone) as a telephone number check means, the abbreviation dial, or the address book (telephone directory).

[0051] In this example, when the notebook computer 3 of the electronic equipment which such a telephone function does not build in, for example, drawing 1, dialed using an external portable radiotelephone, it could be made to carry out the monitor of the number.

[0052] The composition of this example is shown in drawing 8. In this example, the DTME receiver 22 for acting as the monitor of the dial signal DTME taken out from a cellular phone was further added to the modem 4 (PCMCIA card) inserted in a notebook computer 3. A DTME receiver is commercial IC, if DTME is sensed, he will generate INT (interrupt signal), and he can tell the number pushed on the system one by one. It can judge whether it is going to talk over the telephone as the partner by whom the external telephone was registered similarly beforehand by memorizing this by (5-22) of drawing 5 (b).

[0053] (Modification 2) Although the aforementioned example explains an updating data table as a thing only with one transmitting path, a schedule may have to send its personal computer, and the data of the terminal which corresponded according to the informational kind, respectively like [order data / host computer of the head office etc.] separation. [of a branch]

[0054] Then, two or more updating data tables which can set a transmission place as drawing 9 (a), respectively are shown. a

transmission place -- each -- although it exists in an application by the default (you should transmit the data of a schedule to your personal computer in the aforementioned example), a user may set up individually [of a branch] When transmitting this, if it investigates whether it is in agreement with the transmission place of the telephone number which is talking the data of a table over the telephone now [piece / every] as shown in drawing 9 (b) (9-1), and is not in agreement, and goes to see the following table (9-2) and is in agreement, data will be transmitted by drawing 5 (5-11) (9-3). A flow returns to (5-11) of drawing 5 after that.

[0055] Thereby, two or more transmission places can also send data. Furthermore, you may make a flag with updating data for every transmission place of updating data.

[0056] (Modification 3) In the aforementioned example, when one of the users put in a telephone, updating data were automatically exchanged in the background. However, it is more desirable to perform the check of a schedule, a transfer of urgent facsimile, etc. within a certain fixed time.

[0057] Then, by this example, the timer set up according to the urgency of the this updated data at the time of renewal of data is started, and the example which transmits automatically or it reports to a user, when not getting a telephone call, even if it passes the time on which it decides by the timer is shown.

[0058] Drawing 10 is a flow chart at the time of renewal of data being performed. The middle is the same as drawing 4 . (10-9) If data are set to an updating data table, a timer will be set according to the kind of the data (10-13). For example, if it is the renewal of a scheduler, and data of registration of a spurious data, and it is reception of FAX, it is 20 minutes etc. for 1 hour. In addition, although the default of such fixation is sufficient, the updating time limit can be put in and spent into the command which will be interpreted if it is the schedule check by thing like the network description language advocated recently (10-2).

[0059] At (c), an interruption routine when the timer of this time limit exceeds shows the example reported to a user. In advance of an interruption routine, if the electronic equipment is in an OFF state, a power supply is turned on like alarm. (10-14) In order to report to a user, display the message which urges renewal of data to the screen of display 14 with sound-warning, such as a buzzer. A kind, a partner, the telephone number which should be sent, etc. of data are displayed on this screen. (10-15) Turn off and end the aforementioned (10-16) display 14 by checking the volition of a user's O.K.?. Although not illustrated here, it is also possible to set up the power telephone telephone by O.K. so that an on-hook dial may be carried out automatically.

[0060] (d) shows the example of renewal of automatic further. (10-17) Carry out an on-hook dial automatically by the interruption routine, and call a partner. However, since its service cannot be immediately given even when this interruption occurs even if while the user is using his telephone now, it sets and escapes from time again.

[0061] (10-18) Perform the check which will open if it has judged whether there was any response from a partner's call sound (10-19) to each other. (10-20) If it can check, as stated but, all the data without the aforementioned example that exist in a table and that should be updated will be updated.

[0062] Even if it calls more than a certain fixed time, it is not answered, or when busy, fixed time is set further and it ends.

[0063] As mentioned above, by transmitting automatically, or it reports to a user, when there is no renewal of data more than fixed time, the adjustment of data could be taken within fixed time, and informational transfer also became quick at this example. In this example, it is [that there is nothing] applicable with regards to the conditions of sending data and voice simultaneously.

[0064] By this example, as explained above, even when data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, since one circuit was used for the two purpose, phonecall charges could be saved.

[0065] (Modification 4) When it sets to have mentioned above next (example 1) and the voice telephone call is completed in data communication, in order that a user may apply another voice telephone call again, a hand set is raised, or the correspondence when operating the hook icon on a screen is shown in the diagram of drawing 11 .

[0066] In the example of drawing 11 , if it goes into operation which updating data can be communicated in the background, and a voice telephone call finishes, and performs another telephone call again before a user uses mind during a voice telephone call, data communication will be interrupted promptly, a circuit is cut, and it prepares for the next telephone call. In order to interrupt data, a discontinuation command is sent instead of data, and a partner returns a discontinuation check message and cuts a circuit to each other. And it changes into an off-hook state, a circuit is connected, and a user enables it to dial so that it can talk over the telephone again. Although the state where off-hook [of the transmitting side] was carried out during the transfer was shown drawing, even if it, of course, performs the action of a voice telephone call by which, it operates similarly.

[0067] The flow chart of the near device by which the user tried to talk over the telephone again to drawing 12 is shown. Since a hand set is raised or a user shows the volition of a telephone call by operating the hook icon on a screen, a trigger is interrupted in this and a routine is performed. This electronic equipment checks first whether it is under [communication] ***** in the aforementioned background (12-1). What is necessary is just to go into the usual telephone mode (drawing 5) as it is, if it is not among data transfer. In data transfer, in order to interrupt data transfer promptly so that a burden may not be applied to a user about data communication as mentioned above, data (12-2) are made to once finish, and a discontinuation command is sent. And it waits for a partner's check message to come on the contrary (12-3), and a circuit is cut (12-4). Next, the data sent to the middle are processed. For example, processing which can process resending etc. behind is performed. First, if it is data, it judges whether data or ACK was sent here at the time of discontinuation (12-5), and if it is transmission, data or ACK is seen further (12-6), a discontinuation message is put into communication record of a data table, and it moves to telephone mode. If it becomes during ACK transmission, the data packet received now will be discarded (12-8). Data or ACK is similarly seen by the receiving side (12-9), and if it is cancellation of data and ACK, a discontinuation message is put into communication record of a data table, and it moves to telephone mode, if it is data.

[0068] The flow chart by the side of the electronic equipment of the place which is a communication place is shown in drawing 13 . In this interruption, the usual data are terminated unusually (ECC error), and it goes into a discontinuation routine by continuing and receiving a discontinuation command. First, the message which checks discontinuation is returned (13-1), and a circuit is cut (13-2). Next, like the above, according to the state of transmission and reception, it processes so that abnormalities may not occur by intermediate data or an intermediate message (13-3-8).

[0069] By this, this electronic equipment ends communication and returns to a default state.

[0070] As mentioned above, the modem which can send voice and data simultaneously was used, and the example which exchanges the data was shown, without a user letting a user use mind in the background of the telephone usually telephone, when the data which should be updated mutually exist.

[0071] (Modification 5) When priority should be given to a data transfer depending on the urgency and significance of data unlike the aforementioned example, it comes out.

[0072] then, the specific data which the user set up in this example -- or although the data transfer of the kind (for example, ordering data) of data is not completed, if a user is going to talk over the telephone again, it will report that it is during an important data transfer to it

[0073] The die gram is shown in drawing 14 . First, the message of whether an expedited data (with a priority flag) exists in the present data table is added in the case of a partner check. If it checks whether an expedited data is still transmitting at the time of off-hook operation of a user and is under transfer, while telling a user a message from a hand set with voice during a transfer, it takes out also to the display screen, and a real user prevents from telephoning. Although not shown all over drawing, when transmission of an expedited data is completed, an expedited-data completion message is attached behind data. Thereby, existence of an expedited data can be checked on both sides. Although the turn of the data in the aforementioned example to transmit was sent from the data (what has a small table number) containing early, it is interlocked with a priority flag and it is made to send the turn of transmission from a thing with a priority flag.

[0074] The flow chart at this time is shown in drawing 15 .

[0075] In this case, it performs by interruption which responded off-hook. At the time of this interruption, it distinguishes whether it is among data transfer (12-1), if it is not [be / it] under transfer, it will become telephone mode, and if it is under transfer (15-2), the existence of an expedited data will be confirmed. The existence of an expedited data is judged by whether the data with which the priority flag in the data table shown in drawing 16 is given have still finish communicating between the other party. Existence of the other party is based on an expedited-data existence message and an expedited-data completion message as mentioned above at the time of a check of the first partner. The priority flag of a table can also be individually set up, when the schedule of an urgent meeting enters, that a user sets up the kind of data by defaults, such as an order cut-form. Moreover, since the check of the schedule written in said network description language can present significance by the description language when it comes from other men, it interprets it and stands a priority flag.

[0076] and -- if there is an expedited data (15-2) -- from -- even if it adds the speech synthesis which a flow branches to (15-12) and is outputted from the voice generating means 19 as a message in data transfer and warns "to be among data transfer", while urging cautions by beep sound (buzzer), the message in data transfer is displayed on a display -- also coming out -- it is good. Furthermore, it can also prevent from actually telephoning not displaying the soft dial in telephone mode etc. In addition, if there is no expedited data, processing same with having explained in drawing 12 will be performed.

[0077] And when a transfer of an expedited data is completed, electronic equipment is again reported to a user and permits use of a telephone. That is, they are an expedited-data transmitting end, telephone use C, etc. as a display.

[0078] As explained above, even when having depended on this example, data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, since one circuit was used for the two purpose, phonecall charges could be saved.

[0079] Furthermore, before the data with which the user needed the transfer at an early stage were transmitted yet, when it was going to go into the next telephone call action, the warning message was able to be emitted, and the accuracy of data transfer was able to be raised.

[0080] (others -- example) although described as arbitrary as timing which takes out voice information, a means to detect the voice level of the speech information of a circuit further may be added to the interior of the voice generating means 19, a user may judge under a voice telephone call and between talks, and you may control to start a voice message to the timing between talks

[0081] Furthermore, a buzzer and chime sound are passed, and it appeals for cautions, it checks similarly that the voice telephone call of both sides has stopped with a voice level detection means, and you may make it start a voice message. By these, a voice message can be passed, without becoming the hindrance of a telephone call, and the content of a message can be certainly transmitted now to a telephone call person.

[0082] the voice line (a hand set and connection) after a modem 4 separates data and voice with the detection means of voice level -- a monitor -- carrying out -- more than level predetermined in the sum of the level of transmission and reception ***** -- an analog ---like (comparator) -- or digital detection (it compares after A/D conversion) is carried out

[0083]

[Effect of the Invention] If it depends on this invention, it faces transmitting and receiving data and voice simultaneously, and a user can grasp the communication situation of data.

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TECHNICAL FIELD

[Industrial Application] this invention relates to the communication device and correspondence procedure which communicate using a data transfer means by which voice and data can be transmitted simultaneously.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] In recent years, by the miniaturization of computers including a notebook computer, and electronic processing of the stock control by the POS system etc., or cut-form processing, during the time of operating activities (going out), a notebook computer and an exclusive handy terminal are used and the information in a company can be accessed now through a circuit. Consequently, information settlement at the visitor point and the inventory check became easy, and the prompt action was attained.

[0003] That the environment which can be used with the individual base by the highly efficient miniaturization of the aforementioned electronic equipment and low-pricing was ready, and expansion of the service area of a wireless telephone and expansion of the radius of action of the information by low-pricing are also added to this background.

[0004] Moreover, the conventional modem (data, FAX) has applied the modulation, in order to transmit digital data to the analog telephone line which transmits voice, and the usual voice telephone call was not completed at the time of data transfer. However, when the same modem is used on both sides, the modem which can transmit voice and data (data, FAX) simultaneously by the technique of time sharing or a double carrier also came to be developed recently.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when using the modem with which only data are sent, there was no way for which a user knows the state of transmitting data, performing the telephone call with voice, even if it used simultaneously the modem which can be transmitted for the aforementioned data and voice of course. Therefore, it was not user-friendly. Moreover, when voice telephone call and data communication were being simultaneously performed for the another purpose, the case where the advance situation of each communication was mutually contradictory arose.

[0006] this invention aims at offering the communication device and correspondence procedure which raised user-friendliness in view of this point.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] If it depends on this invention, it faces transmitting and receiving data and voice simultaneously, and a user can grasp the communication situation of data.

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MEANS

[Means for Solving the Problem] If it depends on invention of the 1st of this application in order to attain this purpose, it has an information means to report the transceiver state of data according voice and data to the data transfer means in which simultaneous transmission and reception is possible, and the aforementioned data transfer means to the user who is performing the voice telephone call by the aforementioned data transfer means.

[Translation done.]

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OPERATION

[Function] The transceiver state of the data based on the aforementioned data transfer means is reported to a user by the aforementioned information means.

[Translation done.]

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EXAMPLE

[Example] First, the schematic diagram of transmission and reception of the data in the public line by which the communication device of one example of this invention is used for drawing 1 is shown. 1 builds in the wireless telephone function by pocket electronic equipment (drawing is a pen computer). It can be used by directing as a telephone the number of the soft ten key displayed on a screen, or an address book, and voice is exchanged with an operator through the hand set of 2. The existing notebook computer 3 which does not build in the wireless telephone is also easy to be natural [electronic equipment]. In this case, the PCMCIA interface which the electronic equipment 3 has is equipped with a modem 4. Data transfer can also perform a cellular phone 5 on radio by connecting with a modem 4 by the general portable radiotelephone. The modem 4 as a data transfer means of this example can transmit voice and data simultaneously.

[0010] Therefore, with the equipment of this example, voice is also transmitted through a modem 4, namely, it is changed into digital data, and becomes irregular with a modem 4, and speech information is outputted to a circuit. Reception operation serves as the reverse.

[0011] Two kinds of this pocket electronic equipment is used at a going-out place, and it is fixed places, such as in the company, and a personal computer or a host computer 7 is the machine which can manage the schedule of an order cut-form, an inventory situation, and an individual, and, similarly is tied with the public line by the modem 4. A telephone 6 is an ordinary telephone usually used on business. A wireless telephone or connection of a cable comrade is sufficient as a public line. Although pocket electronic equipment was illustrated as a going-out place in this example, fixed machine comrades, such as a desktop machine of a branch and a host computer of a head office, are also easy to be natural.

[0012] Drawing 2 is the outline block diagram showing the composition of the block shown as A of the aforementioned pocket electronic equipment 1 and drawing 1. These both composition is almost the same except for the kind of for example, CPU device being different.

[0013] A keyboard is a standard, if RAM and 11 are input devices, ROM and 12 are pen computers and CPU to which 8 performs control of this electronic equipment 1 or A in drawing 2, circumference I/O on which, as for 9, the CPU circumferences, such as a memory controller, were accumulated, and 10 are a digitizer and a notebook computer. 13 may be VGA of a display controller and liquid crystal or CRT is sufficient as display 14. 15 is the hard disk in which a lot of program and user data are stored, 16 is the interface (PCMCIA) of the IC card which came to be attached to small electronic equipment as standard, and this is equipped also with the modem 4. Of course, it is not the card of such a description formula and you may build. the radio unit 17 -- the plan of a wireless telephone -- following -- an electric wave -- transmitting and receiving. Line control 18 performs control about a circuit, such as telling a non-complex of lines through a radio unit by operation for raising the operation for telephoning, i.e., a hand set, and considering as an off-hook state. The hook control section 20 tells the line connection demand or disconnect request from CPU to line control 18. In fact, the hook state of a hand set is performed, once it judges the whole state by CPU. Even if a user changes into an on-hook state by this so that it may mention later, data transfer is continued as it is. With the sound signal generating means 19, when one side makes a hand set on hook among the communications partners of the both sides which are talking over the telephone, the dial tone at the time of cutting which shows a telephone call end to the communications partner of another side is changed to the exchange, it is made to generate in false or a Dial Tone Multi Frequency is generated. 21 is I/F for connecting with a circuit of a cable like RJ11.

[0014] Drawing 3 shows the diagram showing in what procedure data communication and voice conversation are actually held in the system indicated by this example. Whichever is sufficient as whether a transmitting side and a receiving side are in a going-out place or a company, respectively. The data which should update this example only by the transmitting side shall exist.

[0015] First, a transmitting person raises a hand set 2 or 2', or changes into an "on-hook" state by the hook icon on a screen (not shown). The circuit between the exchanges is opened by it and the exchange returns the dial tone which received that by it. If it can be checked, according to the software with which the electronic equipment itself was decided beforehand, a user will dial automatically. It collates whether CPU8 in a system is in agreement with that into which it is acting as the monitor of the dial, and the dial number was beforehand registered at this time. The dial number registered beforehand is a number of the terminal which has the modem which can send voice and data simultaneously as the other party.

[0016] If it can check that it is in agreement, since the data which should be equipped with the modem with which a partner can send voice and data simultaneously, and should be sent to a partner to both sides may exist, Irrespective of what thing if there is a partner's response, an audio conversation will be By using the channel for transmitting the function of the modem which can transmit and receive voice and data simultaneously, and data, i.e., the channel of the background, a data communication packet is sent by mutual and mutual ID (identification information) is checked mutually. When data to send on one side or both sides exist,

it sends by making it a packet by the data unit, and a receiving side will return ACK each time, if it is easy to perform error checking.

[0017] A start of data communication reports that to a user. An information means may take out "the inside of data transfer" to display 14, or may be simple. [of Light Emitting Diode (not shown) etc.] If data are sent from a transmitting side, it finishes sending all and data are next in a receiving side, it will be sent conversely (not shown in drawing 3).

[0018] Since these data exchanges advance regardless of a voice telephone call and it is made for the situation not to affect a user's conversation or action, as soon as the business in voice ends, a user will operate an on-hook state or the hook icon of a screen for a hand set, and will hang up a telephone.

[0019] However, if data transfer was the middle, line control 18 will keep a circuit connected succeedingly. In order for the partner of a voice telephone call to make it both recognize to have cut the telephone with one side, a cutting tone is emitted by the sound signal generating means 19. A circuit is cut in the place to which data continued being similarly sent and it was altogether sent on both sides also at this time, without a user being conscious.

[0020] Since it connects, since it is the same, the circuit may be performing accounting by continuing a voice telephone call conversely for the user. Then, if it turns out for which data transfer is still performed, another talk can also be carried out according to it. The user displays the "remaining time" with "under the transfer" so that the remaining time can be known at any time. of course, a user -- it may respond for asking and you may display

[0021] The flow chart for realizing the aforementioned diagram to drawing 4 (a) and (b) is shown. First, it is shown what procedure drawing 4 is, when data are updated by the example in the case where the function of a scheduler is given to the system of this example.

[0022] (a) shows the case where a check or an appointment is put in for the schedule of the owner of a pocket device by communication to a personal computer 7 side. Data are received, first (4-1), the message which received (4-2) performs a command interpretation for for what it is asking (here, a check and appointment (4-5) of a schedule (4-3) were put in, and ** was mentioned as the example), and if a command is the check of a schedule, the schedule data on a personal computer (4-4) 7 is returned. Moreover, if it is putting in an appointment and the schedule is vacant, the flag which shows that it registers as a spurious data (4-6), and the data updated (4-7) exist is built, and the pointer of the place which uses as a table how many affairs for there to be in the unit of updating (4-8) data, and exists is stored.

[0023] (b) shows the flow in in any a user registers a new schedule also by the personal computer or pocket electronic equipment, and the case of correcting. In this case, (4-9) it is put into new data at a going-out place with the personal digital assistant with which (4-10) is performed, and if temporary data registration is performed by the personal computer, both sides can do conflict, and the need of taking adjustment comes out.

[0024] Drawing 4 (c) is the example of the updating data table in a personal computer or the pocket electronic equipment 1, and makes the pointer and communication record (the communication start, discontinuation) which show a number (the order of a receptionist), the kinds (a schedule, FAX, order, etc.) of data, a date and time, the capacity of data, and the memory in which data are actually stored to one data. If more than one exist, the **** table exists.

[0025] Next, by drawing 5 (a), when the data which should be updated as shown in drawing 4 (c) exist, the flow chart of the data communication performed in parallel to the voice telephone call of the side to telephone is shown. A personal computer 3, the pocket machine 1, or whichever is sufficient as this.

[0026] (5-1) It is dialed by specifying the partner who connects, dials or applies a circuit so that a user may telephone ordinarily, as mentioned above. (5-2) It checks whether it is that into which the applied dial is registered beforehand. If it is numbers other than registration, it will suppose that it is an audio telephone call, and nothing will be carried out as data communication below (5-3).

[0027] (5-4) Permit a modem 4 at the time of the registered number, it equips data transfer with it, and waits for a partner's (5-5) response. Although not illustrated, when a partner is neither at during the conversation nor a telephone, since a user turns on a hand set and gives up a telephone call, he also interrupts this flow.

[0028] (5-6) Transmit your ID as data in parallel to an audio conversation by a partner's response. And waiting and ID which came (5-8) are collated for the answer of ID from a partner (5-7), and it judges whether it is normal (5-9). When neither the case where there is no answer of ID more than fixed time, nor ID suits from a partner, it becomes correspondence of only a voice telephone call.

[0029] In this case, it is not necessary to communicate through a modem 4.

[0030] (5-10) Check whether the updating data flag shown in the side telephoned next at drawing 4 (c) has left. If it is (5-11), according to the turn of having been put in by the data table, it will packet-ize and will send. (5-25) Transmit mutually the capacity of the data which should next be sent on both sides, and calculate time required for data transfer. The capacity of data is the sum of the capacity sent by its sum total and partner of a data table. And while sending the message of a "data communication start" to a display, the communicative remaining time is displayed at any time. (5-12) Check that data have been safely transmitted by the ACK message from a partner, and delete from a table the data which it finished sending (5-13) each time. And it checks whether all data have finish sending by (5-14), otherwise, (5-11) returns, and the following packet is sent.

[0031] After all ending (5-15), the flag which shows existence of the data which should be updated is lowered.

[0032] When there are no data from the first, and when finishing sending, a message without data (5-16) is sent, and it waits for the answer from a partner (5-17). (5-18) If there is a partner, data will be received conversely, and if there is nothing, transmission and reception of data will be ended there. In (5-19), the situation of a voice telephone call is investigated, and still, when busy, it is made a voice talk state. Already, it ends and conversation cuts a circuit now, if a hand set is an ON state (5-20).

[0033] Processing of (5-25) is shown in drawing 7 (a) in detail here. The sum total of the capacity of the data which a data table should transmit by (17-1) is calculated. And this data is transmitted to a partner (17-2), next a partner's (17-3) data are received (17-4), and it totals with its amount of data. (17-5) Add experientially the time which procedure takes in quest of the real transfer time at it from data capacity and a transfer rate, and consider as required time. (17-6) "Under communication" and "required time" are taken out to the display means 14. Drawing 17 (b) shows the flow chart about amendment of the required time after a display start. Although 1-second interruption is used for the purpose with various systems, it explains only this portion. (17-7) If it has not come to judge whether the time currently displayed was made downed for 1 second (17-8), and it had been 0 second and has judged whether communication will actually be completed further (17-9) as it is if the end is come (17-10), turn off the display under communication. (17-11) Since the time error has arisen in the actual telephone call if communication is not completed, reset up time again from progress of the present communication.

[0034] (b) of drawing 5 describes the check of the telephone number [being shown in (a) of drawing 5 (5-2)] in more detail. The telephone number is, or it is set up how, and it is divided into the two modes. The 1st inputs the soft ten key which appeared in the display screen by electronic equipment 1 by the case where the telephone number is put in with direct (5-21) hand control by pushing with a pen. Moreover, a keyboard and a ten key are pushed in a general notebook computer. Since this is the input device of electronic equipment, it can grasp the number pushed in soft. (5-22) Memorize the number one by one. The 2nd calls the number which does not push direct keys, such as an address book, a telephone directory, an abbreviation dial, etc. in electronic equipment, but is memorized beforehand by the related key (5-23). At this time, shortly after being directed by the user, the target number is known. The telephone number of the these-inputted object compares whether it is in agreement with the number for [which is registered beforehand] transmission. In addition, existence, such as area code, shall be guessed at this time.

[0035] The flows of control of the side in which drawing 5 received the telephone by drawing 6 to the flows of control of the device of the telephoned side having been shown are shown.

[0036] Since there is also the same portion fundamentally, only difference is explained. First, the bell of a telephone rings and someone answers. Since there is nothing from someone or the cut matte, it waits whether to transmit any information data from a data side here (6-3). If there is no fixed time, after judging that it is from the ordinary telephone which does not have the broadcast function of voice data, it is made a voice telephone call. ID is sent, if it is suitable, a partner's data will be received first and, next, the data here will be sent (since other details are the same as drawing 5, explanation is omitted).

[0037] Next, drawing 7 shows interruption processing when voice conversation is completed. When a user shows the end volition of voice conversation clearly, it is constituted so that interruption may occur and the flow of drawing 7 is performed -- a hand set becomes or directs a hook icon to an ON state.

[0038] In this service routine, it checks whether data transfer is performed succeeding first (7-1), and if it continues, a circuit will generate a cutting tone with which it leaves as it is and ***** cut the telephone from the circuit here (7-2). It observes whether a partner cuts according to it (7-3), and (does it become on hook?) generating of a tone will be ended, if it becomes on hook and goes out (7-4). Moreover, if data transfer is completed even if a partner is not on hook, a flow will branch to (7-1) and a circuit will be cut as it is (7-5).

[0039] The example of the display screen is shown in drawing 18. As one of the windows, required communication time is displayed the inside of data transfer. In addition, what is necessary is to click the icon of discontinuation or just to touch with a pen to interrupt communication. Operation when discontinuation is directed is shown in drawing 19.

[0040] (19-1) Send out a discontinuation message instead of data transfer, and wait for a partner's (19-2) consent. And (19-3) it judges whether it is [be / it] under telephone call now in ON/OFF of a hand set, and if it is a telephone call end (19-4), a circuit is cut. Next, the data sent to the middle are processed. (19-5) Judge [which had sent data or ACK here at the time of discontinuation / or or] first whether reception was carried out, if it is transmission (19-6), see data or ACK further, if it is data, put a discontinuation message into communication record of a data table, and end (19-7). (19-8) If it is [ACK / be / it] under transmission, discard the data packet received now. By the receiving side, data or ACK is judged and it processes similarly (19-9) (19-10).

[0041] Furthermore, in spite of having reported the inside of data transfer, when a user once raises a hand set again after closing a telephone call and shows the volition of a telephone call start, while displaying warning as shown in drawing 20, it is made not to put into the next telephone call operation. A user can go into the next telephone call by waiting until data communication is completed, or terminating communication with directions of the aforementioned discontinuation.

[0042] (Example 2) In the aforementioned example, the message indicator to the display means 14 was used as an information means to a user.

[0043] this example shows the example reported in voice using the sound signal generating means 19.

[0044] Drawing 21 is the flow chart of the modification of drawing 17, and explains only difference. (21-6) When data transfer was started, the usual voice conversation was overlapped and "data communication was started. Time is 3 minutes. The message " is sent from the sound signal generating means 19. Moreover, you may make a user recognize by passing tone quality decided beforehand, such as a buzzer and a chime. (21-10) Pass the tone quality which reported "having ended data communication" with voice similarly at the time of a communication end, or was decided. The time (12 (21-11)-6) of producing change at communication time reports the time after change.

[0045] Furthermore, the time of a user once raising a hand set again after closing a telephone call, and showing the volition of a telephone call start, in spite of having reported the inside of data transfer, "data transfer is not completed. Please wait the back for 1 minute. A user is told about messages, such as ", from a hand set with voice.

[0046] Although a display and voice were raised as another example, you may perform information which compounded a display and voice.

[0047] As explained above, even when having depended on this example, data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, a voice telephone call can be effectively used now a lot time by reporting the situation of data communication.

[0048] Furthermore, before data were transmitted yet, when it was going to go into the next telephone call action, the warning message was able to be emitted, and the accuracy of data transfer was able to be raised.

[0049] As mentioned above, the modem which can send voice and data simultaneously was used, and when the data which should be updated mutually existed, the example which a user reports to a user that data are on the occasion of exchange in the background of the telephone usually telephone was shown.

[0050] (Modification 1) In the aforementioned example, the comparison test of them was carried out by registering the name interlocked with acting as the monitor of the number pushed as a judgment means to judge whether a communications partner is a specific partner, with the push button and soft ten key (screen for a telephone) as a telephone number check means, the abbreviation dial, or the address book (telephone directory).

[0051] In this example, when the notebook computer 3 of the electronic equipment which such a telephone function does not build in, for example, drawing 1, dialed using an external portable radiotelephone, it could be made to carry out the monitor of the number.

[0052] The composition of this example is shown in drawing 8. In this example, the DTME receiver 22 for acting as the monitor of the dial signal DTME taken out from a cellular phone was further added to the modem 4 (PCMCIA card) inserted in a notebook computer 3. A DTME receiver is commercial IC, if DTME is sensed, he will generate INT (interrupt signal), and he can tell the number pushed on the system one by one. It can judge whether it is going to talk over the telephone as the partner by whom the external telephone was registered similarly beforehand by memorizing this by (5-22) of drawing 5 (b).

[0053] (Modification 2) Although the aforementioned example explains an updating data table as a thing only with one transmitting path, a schedule may have to send its personal computer, and the data of the terminal which corresponded according to the informational kind, respectively like [order data / host computer of the head office etc.] separation. [of a branch]

[0054] Then, two or more updating data tables which can set a transmission place as drawing 9 (a), respectively are shown. a transmission place -- each -- although it exists in an application by the default (you should transmit the data of a schedule to your personal computer in the aforementioned example), a user may set up individually [of a branch] When transmitting this, if it investigates whether it is in agreement with the transmission place of the telephone number which is talking the data of a table over the telephone now [piece / every] as shown in drawing 9 (b) (9-1), and is not in agreement, and goes to see the following table (9-2) and is in agreement, data will be transmitted by drawing 5 (5-11) (9-3). A flow returns to (5-11) of drawing 5 after that.

[0055] Thereby, two or more transmission places can also send data. Furthermore, you may make a flag with updating data for every transmission place of updating data.

[0056] (Modification 3) In the aforementioned example, when one of the users put in a telephone, updating data were automatically exchanged in the background. However, it is more desirable to perform the check of a schedule, a transfer of urgent facsimile, etc. within a certain fixed time.

[0057] Then, by this example, the timer set up according to the urgency of the this updated data at the time of renewal of data is started, and the example which transmits automatically or it reports to a user, when not getting a telephone call, even if it passes the time on which it decides by the timer is shown.

[0058] Drawing 10 is a flow chart at the time of renewal of data being performed. The middle is the same as drawing 4. (10-9) If data are set to an updating data table, a timer will be set according to the kind of the data (10-13). For example, if it is the renewal of a scheduler, and data of registration of a spurious data, and it is reception of FAX, it is 20 minutes etc. for 1 hour. In addition, although the default of such fixation is sufficient, the updating time limit can be put in and spent into the command which will be interpreted if it is the schedule check by thing like the network description language advocated recently (10-2).

[0059] At (c), an interruption routine when the timer of this time limit exceeds shows the example reported to a user. In advance of an interruption routine, if the electronic equipment is in an OFF state, a power supply is turned on like alarm. (10-14) In order to report to a user, display the message which urges renewal of data to the screen of display 14 with sound-warning, such as a buzzer. A kind, a partner, the telephone number which should be sent, etc. of data are displayed on this screen. (10-15) Turn off and end the aforementioned (10-16) display 14 by checking the volition of a user's O.K.?. Although not illustrated here, it is also possible to set up the power telephone telephone by O.K. so that an on-hook dial may be carried out automatically.

[0060] (d) shows the example of renewal of automatic further. (10-17) Carry out an on-hook dial automatically by the interruption routine, and call a partner. However, since its service cannot be immediately given even when this interruption occurs even if while the user is using his telephone now, it sets and escapes from time again.

[0061] (10-18) Perform the check which will open if it has judged whether there was any response from a partner's call sound (10-19) to each other. (10-20) If it can check, as stated but, all the data without the aforementioned example that exist in a table and that should be updated will be updated.

[0062] Even if it calls more than a certain fixed time, it is not answered, or when busy, fixed time is set further and it ends.

[0063] As mentioned above, by transmitting automatically, or it reports to a user, when there is no renewal of data more than fixed time, the adjustment of data could be taken within fixed time, and informational transfer also became quick at this example.

In this example, it is [that there is nothing] applicable with regards to the conditions of sending data and voice simultaneously. [0064] By this example, as explained above, even when data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, since one circuit was used for the two purpose, phonecall charges could be saved.

[0065] (Modification 4) When it sets to have mentioned above next (example 1) and the voice telephone call is completed in data communication, in order that a user may apply another voice telephone call again, a hand set is raised, or the correspondence when operating the hook icon on a screen is shown in the diagram of drawing 11 .

[0066] In the example of drawing 11 , if it goes into operation which updating data can be communicated in the background, and a voice telephone call finishes, and performs another telephone call again before a user uses mind during a voice telephone call, data communication will be interrupted promptly, a circuit is cut, and it prepares for the next telephone call. In order to interrupt data, a discontinuation command is sent instead of data, and a partner returns a discontinuation check message and cuts a circuit to each other. And it changes into an off-hook state, a circuit is connected, and a user enables it to dial so that it can talk over the telephone again. Although the state where off-hook [of the transmitting side] was carried out during the transfer was shown drawing, even if it, of course, performs the action of a voice telephone call by which, it operates similarly.

[0067] The flow chart of the near device by which the user tried to talk over the telephone again to drawing 12 is shown. Since a hand set is raised or a user shows the volition of a telephone call by operating the hook icon on a screen, a trigger is interrupted in this and a routine is performed. This electronic equipment checks first whether it is under [communication] ***** in the aforementioned background (12-1). What is necessary is just to go into the usual telephone mode (drawing 5) as it is, if it is not among data transfer. In data transfer, in order to interrupt data transfer promptly so that a burden may not be applied to a user about data communication as mentioned above, data (12-2) are made to once finish, and a discontinuation command is sent. And it waits for a partner's check message to come on the contrary (12-3), and a circuit is cut (12-4). Next, the data sent to the middle are processed. For example, processing which can process resending etc. behind is performed. First, if it is data, it judges whether data or ACK was sent here at the time of discontinuation (12-5), and if it is transmission, data or ACK is seen further (12-6), a discontinuation message is put into communication record of a data table, and it moves to telephone mode. If it becomes during ACK transmission, the data packet received now will be discarded (12-8). Data or ACK is similarly seen by the receiving side (12-9), and if it is cancellation of data and ACK, a discontinuation message is put into communication record of a data table, and it moves to telephone mode, if it is data.

[0068] The flow chart by the side of the electronic equipment of the place which is a communication place is shown in drawing 13 . In this interruption, the usual data are terminated unusually (ECC error), and it goes into a discontinuation routine by continuing and receiving a discontinuation command. First, the message which checks discontinuation is returned (13-1), and a circuit is cut (13-2). Next, like the above, according to the state of transmission and reception, it processes so that abnormalities may not occur by intermediate data or an intermediate message (13-3-8).

[0069] By this, this electronic equipment ends communication and returns to a default state.

[0070] As mentioned above, the modem which can send voice and data simultaneously was used, and the example which exchanges the data was shown, without a user letting a user use mind in the background of the telephone usually telephone, when the data which should be updated mutually exist.

[0071] (Modification 5) When priority should be given to a data transfer depending on the urgency and significance of data unlike the aforementioned example, it comes out.

[0072] then, the specific data which the user set up in this example -- or although the data transfer of the kind (for example, ordering data) of data is not completed, if a user is going to talk over the telephone again, it will report that it is during an important data transfer to it

[0073] The die gram is shown in drawing 14 . First, the message of whether an expedited data (with a priority flag) exists in the present data table is added in the case of a partner check. If it checks whether an expedited data is still transmitting at the time of off-hook operation of a user and is under transfer, while telling a user a message from a hand set with voice during a transfer, it takes out also to the display screen, and a real user prevents from telephoning. Although not shown all over drawing, when transmission of an expedited data is completed, an expedited-data completion message is attached behind data. Thereby, existence of an expedited data can be checked on both sides. Although the turn of the data in the aforementioned example to transmit was sent from the data (what has a small table number) containing early, it is interlocked with a priority flag and it is made to send the turn of transmission from a thing with a priority flag.

[0074] The flow chart at this time is shown in drawing 15 .

[0075] In this case, it performs by interruption which responded off-hook. At the time of this interruption, it distinguishes whether it is among data transfer (12-1), if it is not [be / it] under transfer, it will become telephone mode, and if it is under transfer (15-2), the existence of an expedited data will be confirmed. The existence of an expedited data is judged by whether the data with which the priority flag in the data table shown in drawing 16 is given have still finish communicating between the other party. Existence of the other party is based on an expedited-data existence message and an expedited-data completion message as mentioned above at the time of a check of the first partner. The priority flag of a table can also be individually set up, when the schedule of an urgent meeting enters, that a user sets up the kind of data by defaults, such as an order cut-form. Moreover, since the check of the schedule written in said network description language can present significance by the description language when it comes from other men, it interprets it and stands a priority flag.

[0076] and -- if there is an expedited data (15-2) -- from -- even if it adds the speech synthesis which a flow branches to (15-12) and is outputted from the voice generating means 19 as a message in data transfer and warns "to be among data transfer", while

urging cautions by beep sound (buzzer), the message in data transfer is displayed on a display -- also coming out -- it is good. Furthermore, it can also prevent from actually telephoning not displaying the soft dial in telephone mode etc. In addition, if there is no expedited data, processing same with having explained in drawing 12 will be performed.

[0077] And when a transfer of an expedited data is completed, electronic equipment is again reported to a user and permits use of a telephone. That is, they are an expedited-data transmitting end, telephone use C, etc. as a display.

[0078] As explained above, even when having depended on this example, data and voice were able to be sent simultaneously and a user telephoned for the purpose of a voice telephone call, without a user caring, data can be automatically updated now and user-friendliness improved. Furthermore, since one circuit was used for the two purpose, phonecall charges could be saved.

[0079] Furthermore, before the data with which the user needed the transfer at an early stage were transmitted yet, when it was going to go into the next telephone call action, the warning message was able to be emitted, and the accuracy of data transfer was able to be raised.

[Translation done.]

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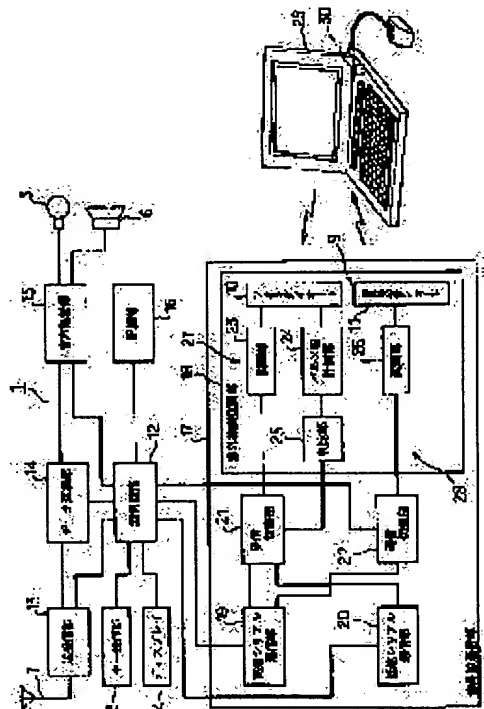
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(54) INFRARED-RAY COMMUNICATION SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an infrared-ray communication system in which operating convenience is enhanced, without sacrificing the light weight and compactness of a portable radio communication equipment when the entire system is incorporated to the portable radio communication equipment without depending on the large-sized system.

SOLUTION: A portable telephone set 1 as a portable radio communication equipment is provided with an infrared-ray communication section 17 for data transfer between an external notebook personal computer 29 and the portable telephone set 1 through of infrared-ray communications. The infrared-ray communication section 17 is provided with a reception changeover section 21, a pulse width measurement section 24 and a discrimination section 25. When receiving the infrared-ray communication data, the section 21, 24, 25 measure each pulse width of the infrared-ray communication data. When the infrared-ray communication data are of low speed control, the control data are given to a low speed serial control means section 20. When the infrared-ray communication data are high speed user data, the user data are given to a high speed serial communication section 19. A single infrared-ray modem section 18 is capable of coping with infrared-ray communication data of different communication speeds.



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2. **** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the infrared-ray-communication equipment which transmits and receives the infrared-ray-communication data of IR frame form based on IrDA specification.

[0002]

[Description of the Prior Art] When the portable telephone has spread widely, connects with a note type personal computer (it is hereafter called a notebook computer for short) through the interconnection cable of exclusive use of a portable telephone in connection with this and operates a notebook computer as one of the carried type radio devices by progress of an electric communication technic in recent years, it is possible to perform data communication.

[0003] In such a case, generally the two data lines of a control data line and a user data line are established by the interconnection cable of the above-mentioned exclusive use between a notebook computer and a portable telephone, control data is transmitted through a control data line for example, by 0.6 kbit/s, and user data is transmitted through a user data line for example, by 9.6 kbit/s.

[0004] By the way, when it takes into consideration that a portable telephone is usually independently used with the composition connected by the interconnection cable of exclusive use of a notebook computer and a portable telephone in performing data communication using a notebook computer in this way, these notebook computers and a portable telephone are arranged in a comparatively near position, the work connected by the interconnection cable of exclusive use of them is needed each time, and the work is very troublesome.

[0005] Then, it considers performing data transfer between a notebook computer and a portable telephone by infrared ray communication to such a problem from the reason nil why it is specifically utilizable in a safe low cost to a human body with radio etc. If a notebook computer and a portable telephone are in the range in which infrared ray communication is possible in performing data communication using a notebook computer according to this thing, the work which connects them by the interconnection cable of exclusive use becomes unnecessary, and improvement in user-friendliness can be aimed at.

[0006] Here, the infrared-ray-communication equipment for realizing infrared ray communication which was mentioned above is considered. Generally infrared-ray-communication equipment is what an infrared strange demodulator circuit and a serial communication circuit consist of corresponding to 1 to 1. as the reception If the infrared-ray-communication data of IR frame form based on IrDA (Infra-red Data Association) specification transmitted from the outside are received An infrared strange demodulator circuit generates the serial communication data of the UART frame form which carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification. a serial communication circuit From the serial communication data, by removing a stop bit in a start bit row, serial data is generated and it outputs.

[0007] Moreover, if serial data is given as transmitting processing of infrared-ray-communication equipment, when a serial communication circuit adds the serial data to it and adds a stop bit to a start bit row, the serial communication data of UART frame form are generated, and an infrared strange demodulator circuit will carry out modulation processing of the serial communication data, will generate the infrared-ray-communication data of IR frame form, and will output them.

[0008]

[Problem(s) to be Solved by the Invention] By the way, the following problems are assumed when performing data transfer between notebook computers and portable telephones which were mentioned above using the infrared ray communication by such infrared-ray-communication equipment.

[0009] That is, between a notebook computer and a portable telephone, since two data with which the transmission speed of control data and user data differs need to be transmitted as mentioned above, it is necessary to prepare two serial communication circuits of the serial communication circuit for control data, and the serial communication circuit for user data. And since the infrared strange demodulator circuit and the serial communication circuit generally correspond to 1 to 1 in connection with it as mentioned above, it is necessary to prepare two infrared strange demodulator circuits corresponding to these two serial communication circuits.

[0010] However, two serial communication circuits are prepared such, and with the composition which prepares two infrared strange demodulator circuits in connection with it, when infrared-ray-communication equipment itself turned on a large scale, it became so and the infrared-ray-communication equipment is built in a portable telephone, a miniaturization will be barred by the lightweight-ized row of a portable telephone.

[0011] this invention is made in view of the situation mentioned above, and the purpose is in moreover offering the

infrared-ray-communication equipment which can aim at improvement in user-friendliness, without barring a miniaturization in the lightweight-ized row of the radio device, when it does not large-sized-ize as the whole equipment and being built in the carried type radio device of a portable telephone etc.

[0012]

[Means for Solving the Problem] If the infrared-ray-communication data of IR frame form that the receiving means was based on IrDA specification are received from the outside according to invention of a claim 1, while generating the communication data of the UART frame form which the recovery means carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification, a discernment means discriminates the pulse width of the infrared-ray-communication data. And reception change control means carry out change control so that the communication data outputted from the recovery means may be given to the communication data-processing means corresponding to the pulse width discriminated by this discernment means based on the discernment result obtained by the discernment means.

[0013] Namely, this invention is set to infrared ray communication. The infrared-ray-communication data of IR frame form based on IrDA specification It is what noted outputting the pulse signal of the time (3/16) of a bit period corresponding to data "0." That is, the infrared-ray-communication data is made to be given to the communication data-processing means corresponding to this pulse width of two or more communication data-processing meanses by discriminating the time width of face (pulse width) of the pulse signal of infrared-ray-communication data.

[0014] Specifically, as infrared-ray-communication data, when the control data of for example, 0.6 kbit/s and the user data of 9.6 kbit/s may be received, if received by the receiving means, while restoring to them by the recovery means, the pulse width is discriminated by the discernment means. And based on the discernment result of a discernment means, the infrared-ray-communication data received as control data come to be given to the communication data-processing means for control data, and, on the other hand, the infrared-ray-communication data received as user data come to be given to the communication data-processing means for user data.

[0015] Since it can respond with one recovery means to two or more communication data-processing meanses in carrying out a deer, and carrying out reception of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as an infrared receiving set. Moreover, since it becomes possible to perform data reception by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the lightweight-ized row of the radio device when it builds the infrared receiving set in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at.

[0016] According to invention of a claim 2, the communication data of UART frame form that two or more communication data-processing meanses were based on IrDA specification are generated. by transmitting change control means When change control is carried out so that the communication data outputted from the communication data-processing means of either of the communication data-processing meanses of these plurality may be given to a modulation means A modulation means generates the infrared-ray-communication data of IR frame form which carried out modulation processing of the given communication data, and was based on IrDA specification, and a transmitting means transmits the infrared-ray-communication data outputted from the modulation means to the exterior.

[0017] By this, using two or more communication data-processing meanses indicated to the claim 1, the control data of for example, 0.6 kbit/s and the user data of 9.6 kbit/s can be changed into infrared-ray-communication data, respectively, and it can transmit to the exterior at two or more serial data and the concrete target from which transmission speed differs.

[0018] Since it can respond with one modulation means to two or more communication data-processing meanses in carrying out a deer, and carrying out transmitting processing of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as an infrared sending set. Moreover, since it becomes possible to perform data transmission by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the lightweight-ized row of the radio device when it builds the infrared sending set in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at like a thing according to claim 1.

[0019] According to invention of a claim 3, two or more infrared-ray-communication data and the concrete target from which transmission speed differs can transmit and receive the control data of for example, 0.6 kbit/s, and the user data of 9.6 kbit/s by having the infrared sending set indicated to the infrared receiving set indicated to the claim 1, and the claim 2.

[0020] Since it can respond to one recovery means row with one modulation means to two or more communication data-processing meanses in carrying out a deer, and carrying out communication (transmission and reception) processing of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as infrared-ray-communication equipment. Moreover, since it becomes possible to perform data communication by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the lightweight-ized row of the radio device when it builds the infrared-ray-communication equipment in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at like a thing according to claim 2 in claim 1 row.

[0021]

[Embodiments of the Invention] Hereafter, this invention is explained with reference to a drawing about one example built in the portable telephone as a carried type radio device. It is in a portable telephone 1 in drawing 2 which shows the whole portable telephone 1 composition. to the front-face side of a case 2 First, "start" key 3a, 3d (in drawing 2, the sign is attached on behalf of "3") of numerical keypads of "redial" key 3b, "end" key 3c, and "0" - "9", "*" (asterisk) key 3e, "#" (sharp) key 3f, a call /

"memory" key 3g, "F (function)" key 3h, "power supply" key 3i, "clearance" key 3j, The loudspeaker (earphone) 6 is formed in the display 4 and microphone (transmitter) 5 row which display the key stroke section 3 and the message in which it comes to prepare "rise scrolling" key 3k and "dounce crawl" key 3l., the telephone number, etc.

[0022] Moreover, while the antenna 7 is formed in the upper part side of a case 2, the infrared sensor 9 is formed in the 16 heart connector 8 row at the lower part side. In this case, the infrared sensor 9 has composition which built the infrared emitting diode 11 as a transmitting means in one at the photodiode 10 row as a receiving means (refer to drawing 1).

[0023] Next, the above-mentioned electric composition of a portable telephone 1 is explained with reference to drawing 1 . The control circuit 12 is constituted considering the microcomputer as a subject, and while the storage section 16 is connected to the transceiver section 13, the data-conversion section 14, and the speech processing section 15 row, the key stroke section 3 and the display 4 which were mentioned above are connected to this control circuit 12. While the speech processing section 15 is connected to the microphone 5 row mentioned above at the loudspeaker 6, it connects with the data-conversion section 14, and the data-conversion section 14 is connected to the transceiver section 13, and the antenna 7 mentioned above is connected to the transceiver section 13.

[0024] Carrying out a deer, by encoding the receiver signal given from the microphone 5, the speech processing section 15 generates voice data, outputs the voice data to the data-conversion section 14, and the data-conversion section 14 changes into telephone call data the voice data given from the speech processing section 15, and it outputs the telephone call data to the transceiver section 13. And the transceiver section 13 transmits to a base station from an antenna 7 by making telephone call data into a sending signal by carrying out modulation processing of the subcarrier by the telephone call data given from the data-conversion section 14.

[0025] Moreover, the transceiver section 13 carries out recovery processing of the telephone call data given to the antenna 7 as an input signal from the base station, outputs the telephone call data by which recovery processing was carried out to the data-conversion section 14, and the data-conversion section 14 changes into voice data the telephone call data given from the transceiver section 13, and it outputs the voice data to the speech processing section 15. And by decrypting the voice data given from the data-conversion section 14, the speech processing section 15 generates a transmission signal, and outputs the transmission signal to a loudspeaker 6.

[0026] Moreover, the infrared-ray-communication section 17 as infrared-ray-communication equipment is connected to the control circuit 12. The infrared-ray-communication section 17 is equipped with the infrared strange recovery section 18, the high-speed serial communications department 19 as a communication data-processing means and the low-speed serial communications department 20, the reception change section 21 as reception change control means, and the transmitting change section 22 as transmitting change control means, and is constituted. And the infrared strange recovery section 18 of them is constituted [other than the photodiode 10 mentioned above and an infrared emitting diode 11] in the recovery section 23 as a recovery means, the pulse width measurement section 24 as a discernment means and the judgment section 25, and the modulation section 26 as a modulation means.

[0027] A deer is carried out and a photodiode 10, the recovery section 23, the pulse width measurement section 24, the judgment section 25, the high-speed serial communications department 19, and the infrared receive section 27 that operates as an infrared receiving set from the reception change section 21 in low-speed serial communications department 20 row are constituted in such composition. again The infrared transmitting section 28 which operates as an infrared sending set is constituted from the transmitting change section 22 by an infrared emitting diode 11, the modulation section 26, the high-speed serial communications department 19, and low-speed serial communications department 20 row.

[0028] Moreover, in the exterior of a portable telephone 1, the note type personal computer (it is hereafter called a notebook computer for short) 29 is arranged, and the infrared sensor 30 is formed in the predetermined part of the background. This infrared sensor 30 has composition which built the infrared emitting diode (not shown) in one at the photodiode (not shown) row like the infrared sensor 9 prepared in the portable telephone 1 mentioned above.

[0029] Now, the photodiode 10 of the above-mentioned portable telephone 1 is outputted to the pulse width measurement section 24 while it will change the infrared-ray-communication data into an electrical signal from a lightwave signal and will output it to the recovery section 23, if the infrared-ray-communication data of IR frame form based on IrDA specification transmitted from the infrared sensor 30 of a notebook computer 29 are received.

[0030] If infrared-ray-communication data are given from a photodiode 10, the recovery section 23 will generate the serial communication data (communication data as used in the field of this invention) of the UART frame form which carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification, and will output the serial communication data to the reception change section 21.

[0031] If infrared-ray-communication data are given from a photodiode 10, the pulse width measurement section 24 will measure the pulse width of the start bit of the infrared-ray-communication data, will output the obtained measurement value to the judgment section 25, and if, as for the judgment section 25, the pulse width measurement section 24 to a measurement value is given, it will output the reception change command signal based on the measurement value to the reception change section 21.

[0032] Based on the reception change command signal to which the reception change section 21 is given from the judgment section 25, a connection state switches between the 1st connection state and the 2nd connection state. When it is in the 1st connection state, while outputting the serial communication data given from the recovery section 23 to the high-speed serial communications department 19, when it is in the 2nd connection state, the serial communication data given from the recovery section 23 are outputted to the low-speed serial communications department 20.

[0033] Serial data is generated by removing a stop bit for the serial communication data of UART frame form that the low-speed

serial communications department 20 was given to the high-speed serial communications department 19 row through the reception change section 21 from the recovery section 23, respectively from it in a start bit row.

[0034] Moreover, when the low-speed serial communications department 20 adds serial data to it and adds a stop bit to a start bit row, serial communication data are generated in these high-speed serial communications department 19 row, and the serial communication data is outputted to it at the transmitting change section 22.

[0035] Based on the transmitting change command signal to which the transmitting change section 22 is given from a control circuit 12, a connection state switches between the 1st connection state and the 2nd connection state. When it is in the 1st connection state, while outputting the serial communication data given from the high-speed serial communications department 19 to the modulation section 26 of the infrared strange recovery section 18 When it is in the 2nd connection state, the serial communication data given from the low-speed serial communications department 20 are outputted to the modulation section 26.

[0036] If serial communication data are given to high-speed serial communications department 19 row through the transmitting change section 22 from either of the low-speed serial communications departments 20, the modulation section 26 will carry out modulation processing of the serial communication data, will generate the infrared-ray-communication data of IR frame form, and will output the infrared-ray-communication data to an infrared emitting diode 11.

[0037] And by changing the infrared-ray-communication data into a lightwave signal from an electrical signal, if infrared-ray-communication data are given from the modulation section 26, and infrared emitting diodes 11 are the exterior and this case, they will transmit to the infrared sensor 30 of a notebook computer 29.

[0038] In the composition mentioned above in addition, between a portable telephone 1 and a notebook computer 29 As infrared-ray-communication data, two data of the control data of 0.6 kbit/s and the user data of 9.6 kbit/s are transmitted. If it is in the infrared-ray-communication section 17 as it corresponds to user data at the control data row from which these transmission speed differs While the high-speed serial communications department 19 processes the user data of 9.6 kbit/s, the low-speed serial communications department 20 processes the control data of 0.6 kbit/s.

[0039] Next, drawing 3 is also referred to and explained about an operation of the above-mentioned composition. In addition, in explanation, as an example, serial data presupposes that it is 8 bit length of "1, 0, 1, 0, 0, 1, 1, 0", as shown in drawing 3 . First, a portable telephone 1 explains operation when receiving the infrared-ray-communication data transmitted from the notebook computer 29.

[0040] For example, a user operates a notebook computer 29, and if the infrared-ray-communication data (refer to drawing 3 (a)) of IR frame form are transmitted from the infrared sensor 30 of a notebook computer 29 and the photodiode 10 of the infrared sensor 9 of a portable telephone 1 receives these infrared-ray-communication data according to it, while the infrared-ray-communication data is changed into an electrical signal from a lightwave signal by the photodiode 10 and being outputted to the recovery section 23, it will be outputted to the pulse width measurement section 24.

[0041] The infrared-ray-communication data given to the recovery section 23 are changed into the serial communication data (refer to drawing 3 (b)) of the UART frame form which recovery processing was carried out and was based on IrDA specification, and the serial communication data is outputted to the reception change section 21. Moreover, as for the infrared-ray-communication data given to the pulse width measurement section 24, the time width of face (pulse width) of the pulse signal of the start bit is measured. And if a measurement value is given to the judgment section 25 from the pulse width measurement section 24, the reception change command signal based on this measurement value will be outputted to the reception change section 21 from the judgment section 25.

[0042] Now, as the infrared-ray-communication data of IR frame form transmitted from the notebook computer 29 were shown in drawing 3 (a), it has the composition that the data "1" as a stop bit were added to the data "0" row as a start bit, and the pulse signal of the time (3/16) of a bit period is outputted to the serial data of 8 bit length here corresponding to data "0" at this time.

[0043] Therefore, in this case, when infrared-ray-communication data are control data of 0.6 kbit/s, the time width of face of a pulse signal, i.e., pulse width, serves as a second (1/3.2k), and when infrared-ray-communication data are the user data of 9.6 kbit/s, pulse width serves as a second (1/51.2k).

[0044] When a deer is carried out and (1/3.2k) is given to the judgment section 25 as a measurement value from the pulse width measurement section 24, the reception change command signal which changes a connection setup of this reception change section 21 into the 2nd connection state is outputted to the reception change section 21 from the judgment section 25. And in response to it, the reception change section 21 will be in the 2nd connection state, and the serial communication data as control data given to the reception change section 21 from the recovery section 23 will be outputted to the low-speed serial communications department 20.

[0045] And the serial communication data as control data given to the low-speed serial communications department 20 are changed into serial data when a stop bit is removed from it by the start bit row, and the serial data as the control data is outputted to a control circuit 12.

[0046] Thus, control data can be transmitted to a portable telephone 1 by infrared ray communication from a notebook computer 29, and transfer control between a portable telephone 1 and a notebook computer 29 can be performed now in a portable telephone 1 side based on the control data.

[0047] On the other hand, when (1/51.2k) is given to the judgment section 25 as a measurement value from the pulse width measurement section 24, the reception change command signal which changes a connection setup of this reception change section 21 into the 1st connection state is outputted to the reception change section 21 from the judgment section 25. And in response to it, the reception change section 21 will be in the 1st connection state, and the serial communication data as user data given to the reception change section 21 from the recovery section 23 will be outputted to the high-speed serial communications

department 19.

[0048] And like the serial communication data as control data given to the low-speed serial communications department 20 which mentioned above, the serial communication data as user data given to the high-speed serial communications department 19 are changed into serial data, when a stop bit is removed [and] by the start bit row, and the serial data as the user data is outputted to a control circuit 12.

[0049] Thus, user data can be transmitted to a portable telephone 1 by infrared ray communication from a notebook computer 29, and the user data can be transmitted now to a base station through the transceiver section 13 by making predetermined processing in a portable telephone 1 side.

[0050] Subsequently, a portable telephone 1 explains operation when receiving the serial data as user data transmitted from the base station. If the serial data as transmitted user data is given to a control circuit 12 through the transceiver section 13 from a base station The serial data as control data is generated by the control circuit 12 in advance of a transfer of the user data. first, the serial data as the control data It is outputted to the low-speed serial communications department 20, and the transmitting change command signal which carries out a connection setup is outputted to the 2nd connection state in this transmitting change section 22 from a control circuit 12 at the transmitting change section 22 at this time.

[0051] The serial data as control data given to the low-speed communications department 20 is changed into the serial communication data of UART form by adding a stop bit to it at a start bit row. And since it changes the transmitting change section 22 into the 2nd connection state, the serial communication data is outputted to the modulation section 26.

[0052] Modulation processing is carried out, the serial communication data as control data given to the modulation section 26 are changed into the infrared-ray-communication data of IR frame form, the infrared-ray-communication data as the control data are outputted to an infrared emitting diode 11, and are changed into a lightwave signal from an electrical signal by the infrared emitting diode 11, and if it is the exterior and this case, it will be outputted to the infrared sensor 30 of a notebook computer 29.

[0053] Thus, in advance of a transfer of user data, control data can be transmitted to a notebook computer 29 by infrared ray communication from a portable telephone 1, and transfer control between a portable telephone 1 and a notebook computer 29 can be performed now by the notebook computer 29 side based on the control data.

[0054] And after this, the serial data as user data given to the control circuit 12 is outputted to the high-speed serial communications department 19, and the transmitting change command signal which carries out a connection setup is outputted to the 1st connection state in this transmitting change section 22 from a control circuit 12 at the transmitting change section 22 at this time.

[0055] The serial data as user data given to the high-speed serial communications department 19 It is made to be the same as that of the serial data as control data given to the low-speed serial communications department 20 which mentioned above. It is changed into the serial communication data of UART form by adding a stop bit to it at a start bit row, and since it changes the transmitting change section 22 into the 1st connection state, the serial communication data as the user data are outputted to the modulation section 26.

[0056] And modulation processing is carried out, the serial communication data as user data given to the modulation section are changed into the infrared-ray-communication data of IR frame form, and the infrared-ray-communication data as the user data are changed into a lightwave signal from an electrical signal by the infrared emitting diode 11, and if it is the exterior and this case, it will be outputted to the infrared sensor 30 of a notebook computer 29.

[0057] Thus, user data can be transmitted to a notebook computer 29 by infrared ray communication from a portable telephone 1, and the user data transmitted from the base station can be transmitted now to a notebook computer 29 in a portable telephone 1 side.

[0058] Thus, since according to this example it constituted so that infrared ray communication might perform data transfer between the notebook computers 29 and portable telephones 1 which formed the infrared-ray-communication section 17 in the portable telephone 1 as a carried type radio communication equipment, and have been arranged outside When performing data transfer between these notebook computers 29 and a portable telephone 1, it becomes possible to perform data transfer by radio, the work which connects them by the interconnection cable of exclusive use becomes unnecessary, and, therefore, improvement in user-friendliness can be aimed at.

[0059] moreover, if it was in the infrared-ray-communication section 17, when the judgment section 25 is formed in the infrared strange recovery section 18 at the reception change section 21 and pulse width measurement section 24 row and infrared-ray-communication data are received The pulse width of infrared-ray-communication data is measured by the judgment section 25 in these pulse width measurement section 24 row. Since it constituted so that these infrared-ray-communication data might be given to high-speed serial communications department 19 row at either of the low-speed serial communications departments 20 based on the measurement value In carrying out reception of two or more infrared-ray-communication data (control data, user data) with which transmission speed differs, it is got blocked, and can respond in the one infrared strange recovery section 18, and, therefore, the infrared receive section 17 does not large-sized-ize [the one recovery section 23 and]. Moreover, in connection with it, a miniaturization is not barred in the lightweight-ized row of the portable telephone 1 which built in the infrared receive section 17.

[0060] Since it constituted so that the pulse width of the start bit which is data "0" with which a pulse signal is certainly outputted in infrared-ray-communication data in this case might be measured especially, even if it is the case where all serial data consist of data "1", reception which was mentioned above can be performed good.

[0061] furthermore, when forming the transmitting change section 22 in the infrared strange recovery section 18 and transmitting infrared-ray-communication data Since it constituted so that the serial communication data outputted to the high-speed serial

communications department 19 row from either of the low-speed serial communications departments 20 according to instructions of a control circuit 12 might be changed into infrared-ray-communication data It can respond in the one modulation section 26 and the infrared [it is got blocked and the number of is one] strange recovery section 18 also in carrying out transmitting processing of two or more infrared-ray-communication data (control data, user data) with which transmission speed differs. [0062] this invention is not limited only to the above-mentioned example, and can be transformed or extended as follows. It may be good also as composition built not only in a portable telephone but in an other carrying type radio device, and control data and user data may be other transmission speed, without restricting to 0.6 kbit/s or 9.6 kbit/s. [0063] As an infrared sensor of a portable telephone or a notebook computer, an infrared emitting diode (light emitting device) and a photodiode (photo detector) may be the things of the composition of another object. As a device prepared outside, you may be other devices equipped with the infrared-ray-communication function, without restricting to a notebook computer.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the infrared-ray-communication equipment which transmits and receives the infrared-ray-communication data of IR frame form based on IrDA specification.

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PRIOR ART

[Description of the Prior Art] When the portable telephone has spread widely, connects with a note type personal computer (it is hereafter called a notebook computer for short) through the interconnection cable of exclusive use of a portable telephone in connection with this and operates a notebook computer as one of the carried type radio devices by progress of an electric communication technic in recent years, it is possible to perform data communication.

[0003] In such a case, generally the two data lines of a control data line and a user data line are established by the interconnection cable of the above-mentioned exclusive use between a notebook computer and a portable telephone, control data is transmitted through a control data line for example, by 0.6 kbit/s, and user data is transmitted through a user data line for example, by 9.6 kbit/s.

[0004] By the way, when it takes into consideration that a portable telephone is usually independently used with the composition connected by the interconnection cable of exclusive use of a notebook computer and a portable telephone in performing data communication using a notebook computer in this way, these notebook computers and a portable telephone are arranged in a comparatively near position, the work connected by the interconnection cable of exclusive use of them is needed each time, and the work is very troublesome.

[0005] Then, it considers performing data transfer between a notebook computer and a portable telephone by infrared ray communication to such a problem from the reason nil why it is specifically utilizable in a safe low cost to a human body with radio etc. If a notebook computer and a portable telephone are in the range in which infrared ray communication is possible in performing data communication using a notebook computer according to this thing, the work which connects them by the interconnection cable of exclusive use becomes unnecessary, and improvement in user-friendliness can be aimed at.

[0006] Here, the infrared-ray-communication equipment for realizing infrared ray communication which was mentioned above is considered. Generally, an infrared strange demodulator circuit and a serial communication circuit are constituted corresponding to 1 to 1, and infrared-ray-communication equipment is the reception. If the infrared-ray-communication data of IR frame form based on IrDA (Infra-red Data Association) specification transmitted from the outside are received, an infrared strange demodulator circuit generates the serial communication data of the UART frame form which carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification, and from the serial communication data, by removing a stop bit in a start bit row, a serial communication circuit will generate serial data and will output it.

[0007] Moreover, if serial data is given as transmitting processing of infrared-ray-communication equipment, when a serial communication circuit adds the serial data to it and adds a stop bit to a start bit row, the serial communication data of UART frame form are generated, and an infrared strange demodulator circuit will carry out modulation processing of the serial communication data, will generate the infrared-ray-communication data of IR frame form, and will output them.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, the following problems are assumed when performing data transfer between notebook computers and portable telephones which were mentioned above using the infrared ray communication by such infrared-ray-communication equipment.

[0009] That is, between a notebook computer and a portable telephone, since two data with which the transmission speed of control data and user data differs need to be transmitted as mentioned above, it is necessary to prepare two serial communication circuits of the serial communication circuit for control data, and the serial communication circuit for user data. And since the infrared strange demodulator circuit and the serial communication circuit generally correspond to 1 to 1 in connection with it as mentioned above, it is necessary to prepare two infrared strange demodulator circuits corresponding to these two serial communication circuits.

[0010] However, two serial communication circuits are prepared such, and with the composition which prepares two infrared strange demodulator circuits in connection with it, when infrared-ray-communication equipment itself turned on a large scale, it became so and the infrared-ray-communication equipment is built in a portable telephone, a miniaturization will be barred by the lightweight-sized row of a portable telephone.

[0011] this invention is made in view of the situation mentioned above, and the purpose is in moreover offering the infrared-ray-communication equipment which can aim at improvement in user-friendliness, without barring a miniaturization in the lightweight-sized row of the radio device, when it does not large-sized-ize as the whole equipment and being built in the carried type radio device of a portable telephone etc.

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MEANS

[Means for Solving the Problem] If the infrared-ray-communication data of IR frame form that the receiving means was based on IrDA specification are received from the outside according to invention of a claim 1, while generating the communication data of the UART frame form which the recovery means carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification, a discernment means discriminates the pulse width of the infrared-ray-communication data. And reception change control means carry out change control so that the communication data outputted from the recovery means may be given to the communication data-processing means corresponding to the pulse width discriminated by this discernment means based on the discernment result obtained by the discernment means.

[0013] Namely, this invention is set to infrared ray communication. The infrared-ray-communication data of IR frame form based on IrDA specification It is what noted outputting the pulse signal of the time (3/16) of a bit period corresponding to data "0." That is, the infrared-ray-communication data is made to be given to the communication data-processing means corresponding to this pulse width of two or more communication data-processing meanses by discriminating the time width of face (pulse width) of the pulse signal of infrared-ray-communication data.

[0014] Specifically, as infrared-ray-communication data, when the control data of for example, 0.6 kbit/s and the user data of 9.6 kbit/s may be received, if received by the receiving means, while restoring to them by the recovery means, the pulse width is discriminated by the discernment means. And based on the discernment result of a discernment means, the infrared-ray-communication data received as control data come to be given to the communication data-processing means for control data, and, on the other hand, the infrared-ray-communication data received as user data come to be given to the communication data-processing means for user data.

[0015] Since it can respond with one recovery means to two or more communication data-processing meanses in carrying out a deer, and carrying out reception of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as an infrared receiving set. Moreover, since it becomes possible to perform data reception by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the lightweight-ized row of the radio device when it builds the infrared receiving set in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at.

[0016] According to invention of a claim 2, the communication data of UART frame form that two or more communication data-processing meanses were based on IrDA specification are generated. by transmitting change control means When change control is carried out so that the communication data outputted from the communication data-processing means of either of the communication data-processing meanses of these plurality may be given to a modulation means A modulation means generates the infrared-ray-communication data of IR frame form which carried out modulation processing of the given communication data, and was based on IrDA specification, and a transmitting means transmits the infrared-ray-communication data outputted from the modulation means to the exterior.

[0017] By this, using two or more communication data-processing meanses indicated to the claim 1, the control data of for example, 0.6 kbit/s and the user data of 9.6 kbit/s can be changed into infrared-ray-communication data, respectively, and it can transmit to the exterior at two or more serial data and the concrete target from which transmission speed differs.

[0018] Since it can respond with one modulation means to two or more communication data-processing meanses in carrying out a deer, and carrying out transmitting processing of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as an infrared sending set. Moreover, since it becomes possible to perform data transmission by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the lightweight-ized row of the radio device when it builds the infrared sending set in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at like a thing according to claim 1.

[0019] According to invention of a claim 3, two or more infrared-ray-communication data and the concrete target from which transmission speed differs can transmit and receive the control data of for example, 0.6 kbit/s, and the user data of 9.6 kbit/s by having the infrared sending set indicated to the infrared receiving set indicated to the claim 1, and the claim 2.

[0020] Since it can respond to one recovery means row with one modulation means to two or more communication data-processing meanses in carrying out a deer, and carrying out communication (transmission and reception) processing of two or more infrared-ray-communication data with which transmission speed differs according to this thing as mentioned above, it does not large-sized-ize as infrared-ray-communication equipment. Moreover, since it becomes possible to perform data communication by radio by moreover adopting infrared ray communication in this way, without barring a miniaturization in the

lightweight-ized row of the radio device when it builds the infrared-ray-communication equipment in the carried type radio device of a portable telephone etc. in connection with it, improvement in user-friendliness can be aimed at like a thing according to claim 2 in claim 1 row.

[0021]

[Embodiments of the Invention] Hereafter, this invention is explained with reference to a drawing about one example built in the portable telephone as a carried type radio device. It is in a portable telephone 1 in drawing 2 which shows the whole portable telephone 1 composition. to the front-face side of a case 2 First, "start" key 3a, 3d (in drawing 2 , the sign is attached on behalf of "3") of numerical keypads of "redial" key 3b, "end" key 3c, and "0" - "9", "*" (asterisk) key 3e, "#" (sharp) key 3f, a call / "memory" key 3g, "F (function)" key 3h, "power supply" key 3i, "clearance" key 3j, The loudspeaker (earphone) 6 is formed in the display 4 and microphone (transmitter) 5 row which display the key stroke section 3 and the message in which it comes to prepare "rise scrolling" key 3k and "dounce crawl" key 3l., the telephone number, etc.

[0022] Moreover, while the antenna 7 is formed in the upper part side of a case 2, the infrared sensor 9 is formed in the 16 heart connector 8 row at the lower part side. In this case, the infrared sensor 9 has composition which built the infrared emitting diode 11 as a transmitting means in one at the photodiode 10 row as a receiving means (refer to drawing 1).

[0023] Next, the above-mentioned electric composition of a portable telephone 1 is explained with reference to drawing 1 . The control circuit 12 is constituted considering the microcomputer as a subject, and while the storage section 16 is connected to the transceiver section 13, the data-conversion section 14, and the speech processing section 15 row, the key stroke section 3 and the display 4 which were mentioned above are connected to this control circuit 12. While the speech processing section 15 is connected to the microphone 5 row mentioned above at the loudspeaker 6, it connects with the data-conversion section 14, and the data-conversion section 14 is connected to the transceiver section 13, and the antenna 7 mentioned above is connected to the transceiver section 13.

[0024] Carrying out a deer, by encoding the receiver signal given from the microphone 5, the speech processing section 15 generates voice data, outputs the voice data to the data-conversion section 14, and the data-conversion section 14 changes into telephone call data the voice data given from the speech processing section 15, and it outputs the telephone call data to the transceiver section 13. And the transceiver section 13 transmits to a base station from an antenna 7 by making telephone call data into a sending signal by carrying out modulation processing of the subcarrier by the telephone call data given from the data-conversion section 14.

[0025] Moreover, the transceiver section 13 carries out recovery processing of the telephone call data given to the antenna 7 as an input signal from the base station, outputs the telephone call data by which recovery processing was carried out to the data-conversion section 14, and the data-conversion section 14 changes into voice data the telephone call data given from the transceiver section 13, and it outputs the voice data to the speech processing section 15. And by decrypting the voice data given from the data-conversion section 14, the speech processing section 15 generates a transmission signal, and outputs the transmission signal to a loudspeaker 6.

[0026] Moreover, the infrared-ray-communication section 17 as infrared-ray-communication equipment is connected to the control circuit 12. The infrared-ray-communication section 17 is equipped with the infrared strange recovery section 18, the high-speed serial communications department 19 as a communication data-processing means and the low-speed serial communications department 20, the reception change section 21 as reception change control means, and the transmitting change section 22 as transmitting change control means, and is constituted. And the infrared strange recovery section 18 of them is constituted [other than the photodiode 10 mentioned above and an infrared emitting diode 11] in the recovery section 23 as a recovery means, the pulse width measurement section 24 as a discernment means and the judgment section 25, and the modulation section 26 as a modulation means.

[0027] A deer is carried out and a photodiode 10, the recovery section 23, the pulse width measurement section 24, the judgment section 25, the high-speed serial communications department 19, and the infrared receive section 27 that operates as an infrared receiving set from the reception change section 21 in low-speed serial communications department 20 row are constituted in such composition. again The infrared transmitting section 28 which operates as an infrared sending set is constituted from the transmitting change section 22 by an infrared emitting diode 11, the modulation section 26, the high-speed serial communications department 19, and low-speed serial communications department 20 row.

[0028] Moreover, in the exterior of a portable telephone 1, the note type personal computer (it is hereafter called a notebook computer for short) 29 is arranged, and the infrared sensor 30 is formed in the predetermined part of the background. This infrared sensor 30 has composition which built the infrared emitting diode (not shown) in one at the photodiode (not shown) row like the infrared sensor 9 prepared in the portable telephone 1 mentioned above.

[0029] Now, the photodiode 10 of the above-mentioned portable telephone 1 is outputted to the pulse width measurement section 24 while it will change the infrared-ray-communication data into an electrical signal from a lightwave signal and will output it to the recovery section 23, if the infrared-ray-communication data of IR frame form based on IrDA specification transmitted from the infrared sensor 30 of a notebook computer 29 are received.

[0030] If infrared-ray-communication data are given from a photodiode 10, the recovery section 23 will generate the serial communication data (communication data as used in the field of this invention) of the UART frame form which carried out recovery processing of the infrared-ray-communication data, and was based on IrDA specification, and will output the serial communication data to the reception change section 21.

[0031] If infrared-ray-communication data are given from a photodiode 10, the pulse width measurement section 24 will measure the pulse width of the start bit of the infrared-ray-communication data, will output the obtained measurement value to the

judgment section 25, and if, as for the judgment section 25, the pulse width measurement section 24 to a measurement value is given, it will output the reception change command signal based on the measurement value to the reception change section 21. [0032] Based on the reception change command signal to which the reception change section 21 is given from the judgment section 25, a connection state switches between the 1st connection state and the 2nd connection state. When it is in the 1st connection state, while outputting the serial communication data given from the recovery section 23 to the high-speed serial communications department 19, when it is in the 2nd connection state, the serial communication data given from the recovery section 23 are outputted to the low-speed serial communications department 20.

[0033] Serial data is generated by removing a stop bit for the serial communication data of UART frame form that the low-speed serial communications department 20 was given to the high-speed serial communications department 19 row through the reception change section 21 from the recovery section 23, respectively from it in a start bit row.

[0034] Moreover, when the low-speed serial communications department 20 adds serial data to it and adds a stop bit to a start bit row, serial communication data are generated in these high-speed serial communications department 19 row, and the serial communication data is outputted to it at the transmitting change section 22.

[0035] Based on the transmitting change command signal to which the transmitting change section 22 is given from a control circuit 12, a connection state switches between the 1st connection state and the 2nd connection state. When it is in the 1st connection state, while outputting the serial communication data given from the high-speed serial communications department 19 to the modulation section 26 of the infrared strange recovery section 18 When it is in the 2nd connection state, the serial communication data given from the low-speed serial communications department 20 are outputted to the modulation section 26.

[0036] If serial communication data are given to high-speed serial communications department 19 row through the transmitting change section 22 from either of the low-speed serial communications departments 20, the modulation section 26 will carry out modulation processing of the serial communication data, will generate the infrared-ray-communication data of IR frame form, and will output the infrared-ray-communication data to an infrared emitting diode 11.

[0037] And by changing the infrared-ray-communication data into a lightwave signal from an electrical signal, if infrared-ray-communication data are given from the modulation section 26, and infrared emitting diodes 11 are the exterior and this case, they will transmit to the infrared sensor 30 of a notebook computer 29.

[0038] In the composition mentioned above in addition, between a portable telephone 1 and a notebook computer 29 As infrared-ray-communication data, two data of the control data of 0.6 kbit/s and the user data of 9.6 kbit/s are transmitted. If it is in the infrared-ray-communication section 17 as it corresponds to user data at the control data row from which these transmission speed differs While the high-speed serial communications department 19 processes the user data of 9.6 kbit/s, the low-speed serial communications department 20 processes the control data of 0.6 kbit/s.

[0039] Next, drawing 3 is also referred to and explained about an operation of the above-mentioned composition. In addition, in explanation, as an example, serial data presupposes that it is 8 bit length of "1, 0, 1, 0, 0, 1, 1, 0", as shown in drawing 3 . First, a portable telephone 1 explains operation when receiving the infrared-ray-communication data transmitted from the notebook computer 29.

[0040] For example, a user operates a notebook computer 29, and if the infrared-ray-communication data (refer to drawing 3 (a)) of IR frame form are transmitted from the infrared sensor 30 of a notebook computer 29 and the photodiode 10 of the infrared sensor 9 of a portable telephone 1 receives these infrared-ray-communication data according to it, while the infrared-ray-communication data is changed into an electrical signal from a lightwave signal by the photodiode 10 and being outputted to the recovery section 23, it will be outputted to the pulse width measurement section 24.

[0041] The infrared-ray-communication data given to the recovery section 23 are changed into the serial communication data (refer to drawing 3 (b)) of the UART frame form which recovery processing was carried out and was based on IrDA specification, and the serial communication data is outputted to the reception change section 21. Moreover, as for the infrared-ray-communication data given to the pulse width measurement section 24, the time width of face (pulse width) of the pulse signal of the start bit is measured. And if a measurement value is given to the judgment section 25 from the pulse width measurement section 24, the reception change command signal based on this measurement value will be outputted to the reception change section 21 from the judgment section 25.

[0042] Now, as the infrared-ray-communication data of IR frame form transmitted from the notebook computer 29 were shown in drawing 3 (a), it has the composition that the data "1" as a stop bit were added to the data "0" row as a start bit, and the pulse signal of the time (3/16) of a bit period is outputted to the serial data of 8 bit length here corresponding to data "0" at this time.

[0043] Therefore, in this case, when infrared-ray-communication data are control data of 0.6 kbit/s, the time width of face of a pulse signal, i.e., pulse width, serves as a second (1/3.2k), and when infrared-ray-communication data are the user data of 9.6 kbit/s, pulse width serves as a second (1/51.2k).

[0044] When a deer is carried out and (1/3.2k) is given to the judgment section 25 as a measurement value from the pulse width measurement section 24, the reception change command signal which changes a connection setup of this reception change section 21 into the 2nd connection state is outputted to the reception change section 21 from the judgment section 25. And in response to it, the reception change section 21 will be in the 2nd connection state, and the serial communication data as control data given to the reception change section 21 from the recovery section 23 will be outputted to the low-speed serial communications department 20.

[0045] And the serial communication data as control data given to the low-speed serial communications department 20 are changed into serial data when a stop bit is removed from it by the start bit row, and the serial data as the control data is outputted to a control circuit 12.

[0046] Thus, control data can be transmitted to a portable telephone 1 by infrared ray communication from a notebook computer 29, and transfer control between a portable telephone 1 and a notebook computer 29 can be performed now in a portable telephone 1 side based on the control data.

[0047] On the other hand, when (1/51.2k) is given to the judgment section 25 as a measurement value from the pulse width measurement section 24, the reception change command signal which changes a connection setup of this reception change section 21 into the 1st connection state is outputted to the reception change section 21 from the judgment section 25. And in response to it, the reception change section 21 will be in the 1st connection state, and the serial communication data as user data given to the reception change section 21 from the recovery section 23 will be outputted to the high-speed serial communications department 19.

[0048] And like the serial communication data as control data given to the low-speed serial communications department 20 which mentioned above, the serial communication data as user data given to the high-speed serial communications department 19 are changed into serial data, when a stop bit is removed [and] by the start bit row, and the serial data as the user data is outputted to a control circuit 12.

[0049] Thus, user data can be transmitted to a portable telephone 1 by infrared ray communication from a notebook computer 29, and the user data can be transmitted now to a base station through the transceiver section 13 by making predetermined processing in a portable telephone 1 side.

[0050] Subsequently, a portable telephone 1 explains operation when receiving the serial data as user data transmitted from the base station. If the serial data as transmitted user data is given to a control circuit 12 through the transceiver section 13 from a base station The serial data as control data is generated by the control circuit 12 in advance of a transfer of the user data. first, the serial data as the control data It is outputted to the low-speed serial communications department 20, and the transmitting change command signal which carries out a connection setup is outputted to the 2nd connection state in this transmitting change section 22 from a control circuit 12 at the transmitting change section 22 at this time.

[0051] The serial data as control data given to the low-speed communications department 20 is changed into the serial communication data of UART form by adding a stop bit to it at a start bit row. And since it changes the transmitting change section 22 into the 2nd connection state, the serial communication data is outputted to the modulation section 26.

[0052] Modulation processing is carried out, the serial communication data as control data given to the modulation section 26 are changed into the infrared-ray-communication data of IR frame form, the infrared-ray-communication data as the control data are outputted to an infrared emitting diode 11, and are changed into a lightwave signal from an electrical signal by the infrared emitting diode 11, and if it is the exterior and this case, it will be outputted to the infrared sensor 30 of a notebook computer 29.

[0053] Thus, in advance of a transfer of user data, control data can be transmitted to a notebook computer 29 by infrared ray communication from a portable telephone 1, and transfer control between a portable telephone 1 and a notebook computer 29 can be performed now by the notebook computer 29 side based on the control data.

[0054] And after this, the serial data as user data given to the control circuit 12 is outputted to the high-speed serial communications department 19, and the transmitting change command signal which carries out a connection setup is outputted to the 1st connection state in this transmitting change section 22 from a control circuit 12 at the transmitting change section 22 at this time.

[0055] The serial data as user data given to the high-speed serial communications department 19 It is made to be the same as that of the serial data as control data given to the low-speed serial communications department 20 which mentioned above. It is changed into the serial communication data of UART form by adding a stop bit to it at a start bit row, and since it changes the transmitting change section 22 into the 1st connection state, the serial communication data as the user data are outputted to the modulation section 26.

[0056] And modulation processing is carried out, the serial communication data as user data given to the modulation section are changed into the infrared-ray-communication data of IR frame form, and the infrared-ray-communication data as the user data are changed into a lightwave signal from an electrical signal by the infrared emitting diode 11, and if it is the exterior and this case, it will be outputted to the infrared sensor 30 of a notebook computer 29.

[0057] Thus, user data can be transmitted to a notebook computer 29 by infrared ray communication from a portable telephone 1, and the user data transmitted from the base station can be transmitted now to a notebook computer 29 in a portable telephone 1 side.

[0058] Thus, since according to this example it constituted so that infrared ray communication might perform data transfer between the notebook computers 29 and portable telephones 1 which formed the infrared-ray-communication section 17 in the portable telephone 1 as a carried type radio communication equipment, and have been arranged outside When performing data transfer between these notebook computers 29 and a portable telephone 1, it becomes possible to perform data transfer by radio, the work which connects them by the interconnection cable of exclusive use becomes unnecessary, and, therefore, improvement in user-friendliness can be aimed at.

[0059] moreover, if it was in the infrared-ray-communication section 17, when the judgment section 25 is formed in the infrared strange recovery section 18 at the reception change section 21 and pulse width measurement section 24 row and infrared-ray-communication data are received The pulse width of infrared-ray-communication data is measured by the judgment section 25 in these pulse width measurement section 24 row. Since it constituted so that these infrared-ray-communication data might be given to high-speed serial communications department 19 row at either of the low-speed serial communications departments 20 based on the measurement value In carrying out reception of two or more infrared-ray-communication data (control data, user data) with which transmission speed differs, it is got blocked, and can respond in the one infrared strange

recovery section 18, and, therefore, the infrared receive section 17 does not large-sized-ize [the one recovery section 23 and]. Moreover, in connection with it, a miniaturization is not barred in the lightweight-ized row of the portable telephone 1 which built in the infrared receive section 17.

[0060] Since it constituted so that the pulse width of the start bit which is data "0" with which a pulse signal is certainly outputted in infrared-ray-communication data in this case might be measured especially, even if it is the case where all serial data consist of data "1", reception which was mentioned above can be performed good.

[0061] furthermore, when forming the transmitting change section 22 in the infrared strange recovery section 18 and transmitting infrared-ray-communication data Since it constituted so that the serial communication data outputted to the high-speed serial communications department 19 row from either of the low-speed serial communications departments 20 according to instructions of a control circuit 12 might be changed into infrared-ray-communication data It can respond in the one modulation section 26 and the infrared [it is got blocked and the number of is one] strange recovery section 18 also in carrying out transmitting processing of two or more infrared-ray-communication data (control data, user data) with which transmission speed differs.

[0062] this invention is not limited only to the above-mentioned example, and can be transformed or extended as follows. It may be good also as composition built not only in a portable telephone but in an other carrying type radio device, and control data and user data may be other transmission speed, without restricting to 0.6 kbit/s or 9.6 kbit/s.

[0063] As an infrared sensor of a portable telephone or a notebook computer, an infrared emitting diode (light emitting device) and a photodiode (photo detector) may be the things of the composition of another object. As a device prepared outside, you may be other devices equipped with the infrared-ray-communication function, without restricting to a notebook computer.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram showing one example of this invention

[Drawing 2] The appearance perspective diagram of a portable telephone

[Drawing 3] Drawing showing serial communication data in an infrared-ray-communication data row

[Description of Notations]

A photodiode (receiving means) and 11 among a drawing ten An infrared emitting diode (transmitting means), 17 the infrared strange recovery section and 19 for the infrared-ray-communication section (infrared-ray-communication equipment) and 18 The high-speed serial communications department (communication data-processing means), The low-speed serial communications department (communication data-processing means) and 21 20 The reception change section (reception change control means), 22 -- for the pulse width measurement section (discernment means) and 25, as for the modulation section (modulation means) and 27, the judgment section (discernment means) and 26 are [the transmitting change section (transmitting change control means) and 23 / the recovery section (recovery means) and 24 / an infrared receive section (infrared receiving set) and 28] the infrared transmitting sections (infrared sending set)

[Translation done.]

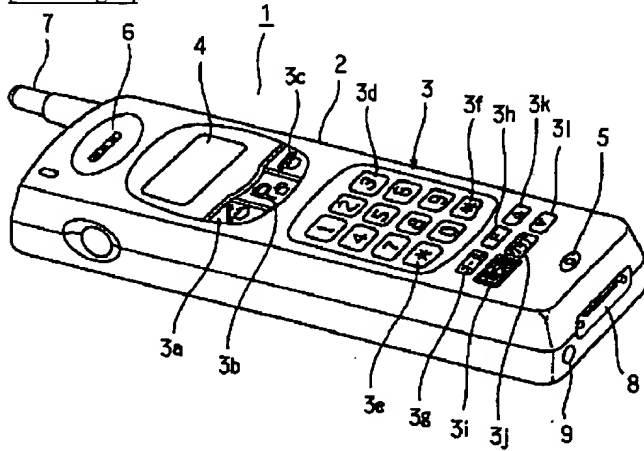
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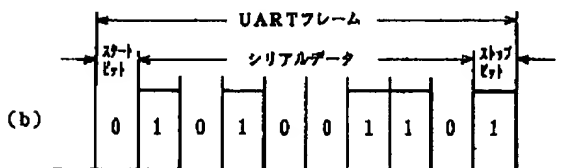
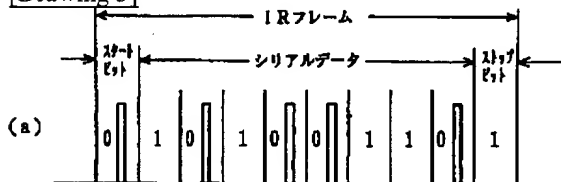
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DRAWINGS

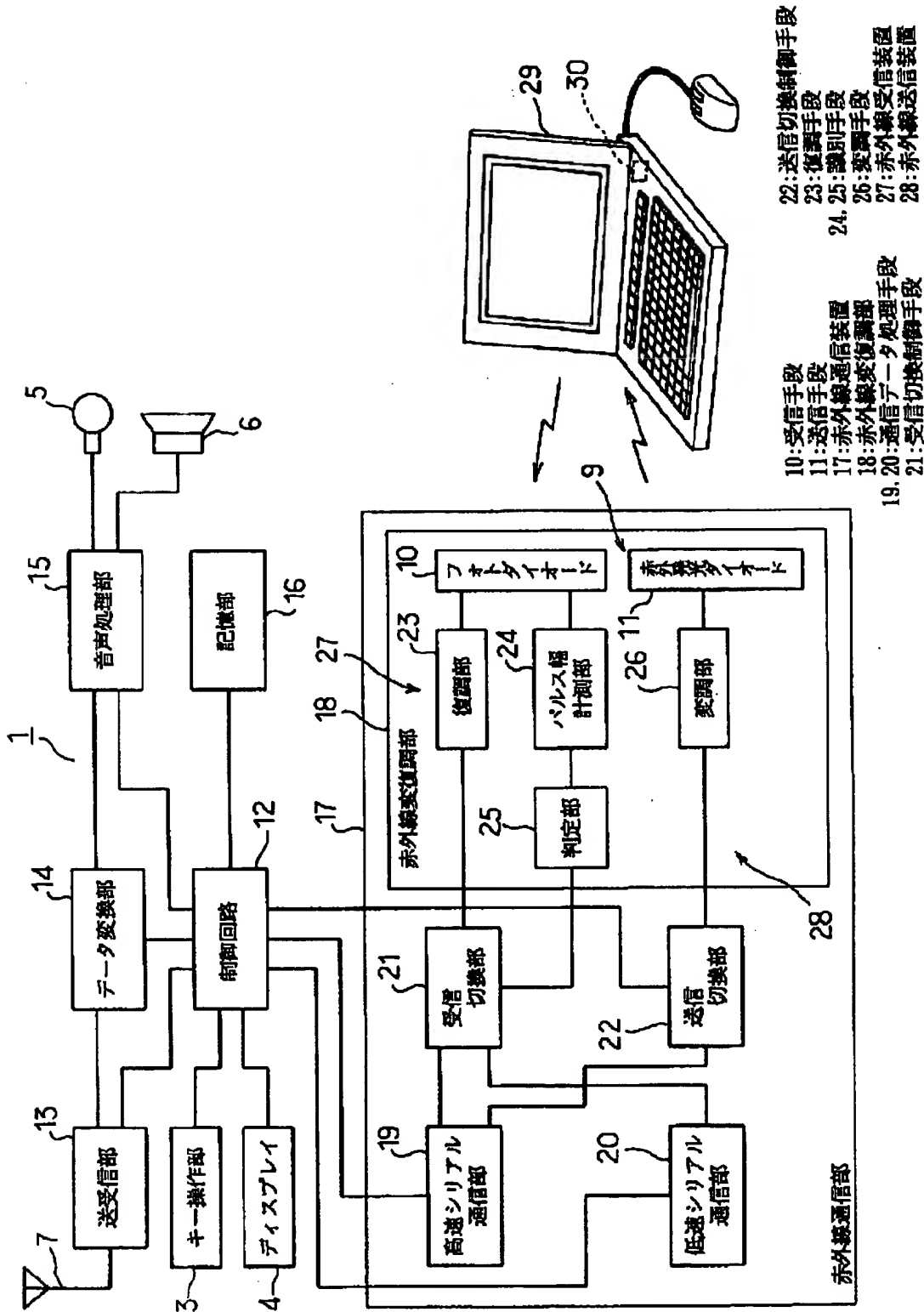
[Drawing 2]



[Drawing 3]



[Drawing 1]



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CLAIMS

[Claim(s)]

[Claim 1] A receiving means to receive the infrared-ray-communication data of IR frame form based on IrDA specification from the outside, A recovery means to generate the communication data of the UART frame form which carried out recovery processing of the infrared-ray-communication data received by this receiving means, and was based on IrDA specification, Two or more communication data-processing meanses to process the communication data outputted from this recovery means, A discernment means to discriminate the pulse width of the infrared-ray-communication data received by the aforementioned receiving means, The communication data outputted from the aforementioned recovery means based on the discernment result obtained by this discernment means by the aforementioned discernment means of two or more aforementioned communication data-processing meanses The infrared receiving set characterized by having the reception change control means which carry out change control so that it may be given to the communication data-processing means corresponding to the discriminated pulse width.

[Claim 2] The infrared sending set characterized by providing the following. Two or more communication data-processing meanses to generate the communication data of the UART frame form based on IrDA specification. A modulation means to generate the infrared-ray-communication data of IR frame form which carried out modulation processing of the communication data outputted from the communication data-processing means of these plurality, and was based on IrDA specification. A transmitting means to transmit the infrared-ray-communication data outputted from this modulation means to the exterior. Transmitting change control means which carry out change control so that the communication data outputted from the communication data-processing means of either of two or more aforementioned communication data-processing meanses may be given to the aforementioned modulation means.

[Claim 3] Infrared-ray-communication equipment characterized by having an infrared receiving set according to claim 1 and an infrared sending set according to claim 2.

[Translation done.]

PATENT ABSTRACTS OF JAPAN

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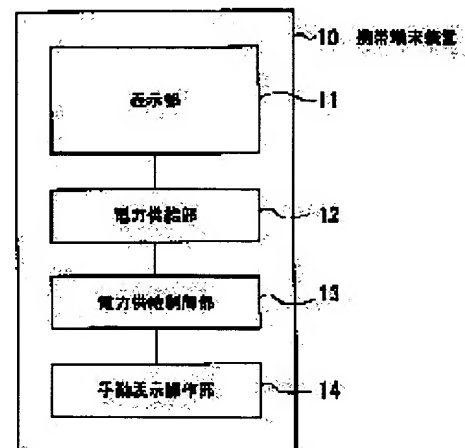
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OGISO TAKAYUKI

(54) PORTABLE TERMINAL EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce power consumption of a display section in the case that the terminal equipment has a communication function.

SOLUTION: The portable terminal equipment 10 is, e.g. a notebook personal computer and incorporates a communication function. The portable terminal equipment 10 makes data transmission/reception via a communication channel by connecting a portable telephone set or a personal handy phone system(PHS) or the like to the terminal equipment 10. A manual display operation section 14 is, e.g. a push button provided as part of a key board and a display is commanded by pressing the manual display operation section 14. When a display is commanded, a power supply control section 13 controls the power supply required for the display from a power supply section 12 to a display section 11. While the manual display operation section 14 is being depressed, the power supply section 12 supplies power to the display section 11 and when a hand is detached from the manual display operation section 14, power supply is again interrupted.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to personal digital assistant equipment equipped with especially the display function about the personal digital assistant equipment which has communication facility.

[0002]

[Description of the Prior Art] Now, equipments including various personal digital assistants, such as a notebook sized personal computer, can refer various data, such as text information and image information. These personal digital assistant equipments are equipped with communication facility, and an alphabetic data, voice data, image data, etc. can be sent [recently,] now and received regardless of a place through a cellular phone, PHS (Personal Handyphone System), a wire telephone, ISDN (comprehensive digital communication network), satellite communication, the Internet, etc. and various communication media.

[0003]

[Problem(s) to be Solved by the Invention] By the way, with personal digital assistant equipment, in order to use a battery, it is required to lessen consumption of power as much as possible. However, the power consumption of the display for displaying data has a very large rate to the power consumption of the whole personal digital assistant equipment. Especially when the liquid crystal display (LCD) is used, power consumption is very large in order to use the back light for LCD.

[0004] Moreover, conventionally, with personal digital assistant equipment, since the display was driven even when a display was not needed, useless power consumption is performed and it had become the factor which shortens the operating time of personal digital assistant equipment. Moreover, the large-sized battery is needed from this and there was a problem that the volume and the weight of personal digital assistant equipment became large.

[0005] this invention is made in view of such a point, and it aims at offering the personal digital assistant equipment which can reduce the power consumption of a display.

[0006]

[Means for Solving the Problem] In the personal digital assistant equipment which has communication facility in order to solve the above-mentioned technical problem in this invention The display which displays an alphabetic data etc., and the electric power supply section which performs the electric power supply to the aforementioned display, The personal digital assistant equipment characterized by having the manual display control unit which performs a display command manually by the user, and the electric power supply control section controlled according to the display command from the aforementioned manual display control unit to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display is offered.

[0007] If a manual display control unit is used and a user performs a display command manually, an electric power supply control section will be controlled by such personal digital assistant equipment to perform an electric power supply required for a display from the electric power supply section to a display. Thereby, when required for a user, the electric power supply to a display is not made, but power consumption is reduced [except].

[0008] Moreover, the display which displays an alphabetic data etc. in this invention in the personal digital assistant equipment which has communication facility, The electric power supply section which performs the electric power supply to the aforementioned display, and a communication data analysis means to analyze the content of the data under communication and to judge the end of the aforementioned communication, When the power supply to the aforementioned display is reduced or cut during the aforementioned communication and the end of the aforementioned communication is judged The personal digital assistant equipment characterized by having the electric power supply control section controlled to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display is offered.

[0009] With such personal digital assistant equipment, by the communication data analysis means, the content of the data under communication is analyzed and a communicative end is judged. During communication, an electric power supply control section is controlled to perform an electric power supply required for a display from the electric power supply section to a display, when the power supply to a display is reduced or cut and a communicative end is judged by the analysis of the data under communication by the communication data analysis means. Thereby, data display of a display is automatically performed only after a display unnecessary during communication is not made but transmission and reception of data complete it, and power consumption is reduced.

[0010]

[Embodiments of the Invention] Hereafter, one gestalt of this invention is explained with reference to a drawing. Drawing 1 is

the block diagram showing the concept of the function of the 1st gestalt of this invention. Personal digital assistant equipment 10 is a notebook sized personal computer, and contains communication facility. This personal digital assistant equipment 10 can send and receive data through a communication line by connecting a cellular phone, PHS, etc. Moreover, the display 11 for displaying an alphabetic data and image data is formed in personal digital assistant equipment 10. It is a liquid crystal display and a display 11 is driven by the supply voltage from the electric power supply section 12 which consists of a battery etc.

[0011] The manual display control unit 14 is the push button prepared as some keyboards, and when a user wants to display, a display command is made by pushing this manual display control unit 14. If a display command is made, the electric power supply control section 13 will be controlled to perform an electric power supply required for a display from the electric power supply section 12 to a display 11. The electric power supply control section 13 makes an electric power supply cut again, when power is made to supply to a display 11 from the electric power supply section 12 and a hand is lifted from the manual display control unit 14, while the manual display control unit 14 is pushed. In addition, an indicative data on display is sent to a display 11 by the display-control function which is not illustrated.

[0012] Since the personal digital assistant equipment 10 of this gestalt can be displayed according to a demand of a user and the electric power supply to a display 11 can be cut by such composition except it, power consumption can be reduced sharply. Thereby, since a battery can be made small, the personal digital assistant equipment 10 whole also turns lightweight.

[0013] Next, the 2nd gestalt of this invention is explained. Drawing 2 is the block diagram showing the concept of the function of the 2nd gestalt of this invention. Personal digital assistant equipment 20 is a notebook sized personal computer as well as [for example,] personal digital assistant equipment 10. It is a liquid crystal display and the display 21 for displaying an alphabetic data and image data is driven by the supply voltage from the electric power supply section 22 which consists of a battery etc.

[0014] The communication facility section 24 performs transmission and reception of other communication terminals and data through a cellular phone, PHS, a modem, etc. When it has the communication data analysis means and communication of data is performed, the communication facility section 24 analyzes the data, and judges a communicative end. When the communication facility section 24 judges a communication end, it tells the electric power supply control section 23 about it. During communication, when the electric power supply control section 23 performs a minimum electric power supply or a power cut to a display 21 and receives a communication end, it controls the electric power supply section 22 to perform sufficient electric power supply for a display 21.

[0015] Next, an example of the judgment method of a communication end is explained. Here, the judgment method in case PHS shall be used as means of communications and the protocol of PIAFS (PHS Internet Access Fourm Standard) is applied is shown.

[0016] Drawing 3 is drawing showing the specification of the data transmission of PIAFS. The 640-bit amount of data is given and the data frame DF in PIAFS consists of the judgment sections FCS (32 bits) which judge the correction of the identifier FI (4 bits) which gives frame classification, transmitting frame number FFI (6 bits), receiving frame number FBI (6 bits), data length DL (8 bits), user data UD (584 bits), and a frame.

[0017] A data length DL is data with which 1 bit of a head in 8-bit data is called continuation bit DLa, and the remaining data lengths DLa with actual 7 bits are shown. It is bit which shows whether a series of data end the continuation bit DLa with the data frame DF, it is shown that data continue when the data of the continuation bit DLa are "1", and when the data of the continuation bit DLa are "0", it is shown that data are completed with the data frame DF.

[0018] The communication facility section 24 judges the communication end of data by reading that this continuation bit DLa is "0." In this way, while being able to aim at power saving automatically by analyzing data and performing the display control of a display 21, operability improves.

[0019] Next, the 3rd gestalt of this invention is explained. Drawing 4 is the block diagram showing the concept of the function of the 3rd gestalt of this invention. The display 31 for displaying an alphabetic data and image data is formed in personal digital assistant equipment 30. It is a liquid crystal display and a display 31 is driven by the supply voltage from the electric power supply section 32 which consists of a battery etc. The manual display control unit 34 is the push button prepared as some keyboards, and when a user wants to display, a display command is made by pushing this manual display control unit 34. If a display command is made, the electric power supply control section 33 will be controlled to perform an electric power supply required for a display from the electric power supply section 32 to a display 31.

[0020] While the manual display control unit 34 is pushed, when power is made to supply to a display 31 from the electric power supply section 32 and a hand is lifted from the manual display control unit 34, only a cut or indispensable power makes an electric power supply supply [control section / electric power supply / 33] again. In addition, an indicative data on display is sent to a display 31 by the display-control function which is not illustrated.

[0021] On the other hand, the communication facility section 37 performs transmission and reception of other communication terminals and data through a cellular phone, PHS, a modem, etc. When it has the communication data analysis means and communication of data is performed, the communication facility section 37 analyzes the data, and judges a communicative end. About the analysis method of this data, it is almost the same as the 2nd gestalt, and is good. When the communication facility section 37 judges a communication end, it tells the notice judgment section 36 of voice about it. The notice judgment section 36 of voice which received the communication end of data drives the notice section 35 of voice which consists of a loudspeaker, a drive circuit, etc., and outputs voice or notice sound. This tells that communication of a displayable data was completed to a user.

[0022] By hearing the voice or notice sound of the notice section 35 of voice, a user can know that a display 31 is in the state which can be displayed. And the display by the display 31 is attained by pushing the manual display control unit 34 mentioned

above.

[0023] Drawing 5 is a flow chart which shows the procedure of the electric power supply control to the display in the 3rd form of this invention.

[S1] If it judges whether it is under communication now and is under communication, it will progress to Step S2, otherwise, will progress to Step S6.

[S2] The electric power supply to a display 31 is reduced or cut.

[S3] The data under communication are analyzed.

[S4] It judges whether it is a communication end, in the analysis of data, if it is an end, it will progress to Step S5, and if it is not an end, it will return to Step S3.

[S5] A user is told about a communication end with voice etc.

[S6] If it judges whether the button of a display command was pushed, and are pushed and it will not be progressed and pushed on Step S7, it returns to Step S1.

[S7] It displays on a display 31 by performing an electric power supply.

[S8] It judges whether the button of a display command was canceled, and if are canceled, and this flow chart will be ended and it will not be canceled, it returns to Step S7.

[0024] Thus, it can express as the timing which can reduce power consumption upwards and a user wishes by telling a user about the state which can be displayed to sound, and being made to perform a display command manually further.

[0025] In addition, with the 3rd gestalt, although the user was told about the state which can be displayed to sound, you may use vibration etc.

[0026]

[Effect of the Invention] In this invention, as explained above, since it was made to perform an electric power supply required for a display to the display when the user performed the display command manually, when required for a user, the electric power supply to a display can be cut and power consumption can be reduced [except] sharply. Thereby, since a battery can be made small, the whole personal digital assistant equipment also turns lightweight.

[0027] moreover, when the contents of the data under communication were analyzed, the communicative end was judged in this invention, the power supply to a display is reduced or cut during communication and a communicative end is judged Since it was made to perform an electric power supply required for a display from the electric power supply section to the display, data display of a display is automatically performed only after a display unnecessary during communication is not made but transmission and reception of data complete it, and power consumption is reduced.

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] Now, equipments including various personal digital assistants, such as a notebook sized personal computer, can refer various data, such as text information and image information. These personal digital assistant equipments are equipped with communication facility, and an alphabetic data, voice data, image data, etc. can be sent [recently,] now and received regardless of a place through a cellular phone, PHS (Personal Handyphone System), a wire telephone, ISDN (comprehensive digital communication network), satellite communication, the Internet, etc. and various communication media.

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EFFECT OF THE INVENTION

[Effect of the Invention] In this invention, as explained above, since it was made to perform an electric power supply required for a display to the display when the user performed the display command manually, when required for a user, the electric power supply to a display can be cut and power consumption can be reduced [except] sharply. Thereby, since a battery can be made small, the whole personal digital assistant equipment also turns lightweight.

[0027] Moreover, in this invention, the contents of the data under communication are analyzed, a communicative end is judged, and the power supply to a display is reduced or cut during communication. Since it was made to perform an electric power supply required for a display from the electric power supply section to the display when it carried out and a communicative end was judged, data display of a display is automatically performed only after a display unnecessary during communication is not made but transmission and reception of data complete it, and power consumption is reduced.

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TECHNICAL PROBLEM

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[0004] Moreover, conventionally, with personal digital assistant equipment, since the display was driven even when a display was not needed, useless power consumption is performed and it had become the factor which shortens the operating time of personal digital assistant equipment. Moreover, the large-sized battery is needed from this and there was a problem that the volume and the weight of personal digital assistant equipment became large.

[0005] this invention is made in view of such a point, and it aims at offering the personal digital assistant equipment which can reduce the power consumption of a display.

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CLAIMS

[Claim(s)]

[Claim 1] Personal digital assistant equipment characterized by to have the display which displays an alphabetic data etc., the electric power supply section which performs the electric power supply to the aforementioned display, the manual display control unit which performs a display command manually by the user, and the electric power supply control section controlled to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display according to the display command from the aforementioned manual display control unit in the personal digital assistant equipment which has communication facility.

[Claim 2] It is personal digital assistant equipment according to claim 1 characterized by being constituted so that the button for display commands is prepared in the aforementioned manual display control unit, and the aforementioned electric power supply control section may perform an electric power supply required for a display to the aforementioned display, while the aforementioned button for display commands is pushed.

[Claim 3] Personal digital assistant equipment which is characterized by providing the following and which has communication facility. The display which displays an alphabetic data etc. The electric power supply section which performs the electric power supply to the aforementioned display. A communication data analysis means to analyze the content of the data under communication and to judge the end of the aforementioned communication. It is the electric power supply control section controlled to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display when the power supply to the aforementioned display is reduced or cut and the end of the aforementioned communication is judged during the aforementioned communication.

[Claim 4] It is personal digital assistant equipment according to claim 3 characterized by being constituted so that the aforementioned communication may be performed by the PIAFS method, the aforementioned communication data analysis means may read the continuation bit of a data frame and the end of the aforementioned communication may be judged.

[Claim 5] Personal digital assistant equipment which is characterized by providing the following and which has communication facility. The display which displays an alphabetic data etc. The electric power supply section which performs the electric power supply to the aforementioned display. The manual display control unit which performs a display command manually by the user. A communication data-analysis means analyze the content of the data under communication and judge the end of the aforementioned communication, the notice judgment section of voice which drive the notice section of voice which consists of a loudspeaker, a drive circuit, etc., and will output in voice or notice sound if the end of the aforementioned communication is judged, and the electric power supply control section control to carry out an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display according to the display command from the aforementioned manual display control unit.

[Claim 6] It is personal digital assistant equipment according to claim 5 characterized by being constituted so that the aforementioned communication may be performed by the PIAFS method, the aforementioned communication data analysis means may read the continuation bit of a data frame and the end of the aforementioned communication may be judged.

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MEANS

[Means for Solving the Problem] In the personal digital assistant equipment which has communication facility in order to solve the above-mentioned technical problem in this invention The display which displays an alphabetic data etc., and the electric power supply section which performs the electric power supply to the aforementioned display, The personal digital assistant equipment characterized by having the manual display control unit which performs a display command manually by the user, and the electric power supply control section controlled according to the display command from the aforementioned manual display control unit to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display is offered.

[0007] If a manual display control unit is used and a user performs a display command manually, an electric power supply control section will be controlled by such personal digital assistant equipment to perform an electric power supply required for a display from the electric power supply section to a display. Thereby, when required for a user, the electric power supply to a display is not made, but power consumption is reduced [except].

[0008] Moreover, the display which displays an alphabetic data etc. in this invention in the personal digital assistant equipment which has communication facility, The electric power supply section which performs the electric power supply to the aforementioned display, and a communication data analysis means to analyze the content of the data under communication and to judge the end of the aforementioned communication, When the power supply to the aforementioned display is reduced or cut during the aforementioned communication and the end of the aforementioned communication is judged The personal digital assistant equipment characterized by having the electric power supply control section controlled to perform an electric power supply required for a display from the aforementioned electric power supply section to the aforementioned display is offered.

[0009] With such personal digital assistant equipment, by the communication data analysis means, the content of the data under communication is analyzed and a communicative end is judged. During communication, an electric power supply control section is controlled to perform an electric power supply required for a display from the electric power supply section to a display, when the power supply to a display is reduced or cut and a communicative end is judged by the analysis of the data under communication by the communication data analysis means. Thereby, data display of a display is automatically performed only after a display unnecessary during communication is not made but transmission and reception of data complete it, and power consumption is reduced.

[0010]

[Embodiments of the Invention] Hereafter, one gestalt of this invention is explained with reference to a drawing. Drawing 1 is the block diagram showing the concept of the function of the 1st gestalt of this invention. Personal digital assistant equipment 10 is a notebook sized personal computer, and contains communication facility. This personal digital assistant equipment 10 can send and receive data through a communication line by connecting a cellular phone, PHS, etc. Moreover, the display 11 for displaying an alphabetic data and image data is formed in personal digital assistant equipment 10. It is a liquid crystal display and a display 11 is driven by the supply voltage from the electric power supply section 12 which consists of a battery etc.

[0011] The manual display control unit 14 is the push button prepared as some keyboards, and when a user wants to display, a display command is made by pushing this manual display control unit 14. If a display command is made, the electric power supply control section 13 will be controlled to perform an electric power supply required for a display from the electric power supply section 12 to a display 11. The electric power supply control section 13 makes an electric power supply cut again, when power is made to supply to a display 11 from the electric power supply section 12 and a hand is lifted from the manual display control unit 14, while the manual display control unit 14 is pushed. In addition, an indicative data on display is sent to a display 11 by the display-control function which is not illustrated.

[0012] Since the personal digital assistant equipment 10 of this gestalt can be displayed according to a demand of a user and the electric power supply to a display 11 can be cut by such composition except it, power consumption can be reduced sharply. Thereby, since a battery can be made small, the personal digital assistant equipment 10 whole also turns lightweight.

[0013] Next, the 2nd gestalt of this invention is explained. Drawing 2 is the block diagram showing the concept of the function of the 2nd gestalt of this invention. Personal digital assistant equipment 20 is a notebook sized personal computer as well as [for example,] personal digital assistant equipment 10. It is a liquid crystal display and the display 21 for displaying an alphabetic data and image data is driven by the supply voltage from the electric power supply section 22 which consists of a battery etc.

[0014] The communication facility section 24 performs transmission and reception of other communication terminals and data through a cellular phone, PHS, a modem, etc. When it has the communication data analysis means and communication of data is performed, the communication facility section 24 analyzes the data, and judges a communicative end. When the communication

facility section 24 judges a communication end, it tells the electric power supply control section 23 about it. During communication, when the electric power supply control section 23 performs a minimum electric power supply or a power cut to a display 21 and receives a communication end, it controls the electric power supply section 22 to perform sufficient electric power supply for a display 21.

[0015] Next, an example of the judgment method of a communication end is explained. Here, the judgment method in case PHS shall be used as means of communications and the protocol of PIAFS (PHS Internet Access Fourm Standard) is applied is shown.

[0016] Drawing 3 is drawing showing the specification of the data transmission of PIAFS. The 640-bit amount of data is given and the data frame DF in PIAFS consists of the judgment sections FCS (32 bits) which judge the correction of the identifier FI (4 bits) which gives frame classification, transmitting frame number FFI (6 bits), receiving frame number FBI (6 bits), data length DL (8 bits), user data UD (584 bits), and a frame.

[0017] A data length DL is data with which 1 bit of a head in 8-bit data is called continuation bit DL_a, and the remaining data lengths DL_a with actual 7 bits are shown. It is bit which shows whether a series of data end the continuation bit DL_a with the data frame DF, it is shown that data continue when the data of the continuation bit DL_a are "1", and when the data of the continuation bit DL_a are "0", it is shown that data are completed with the data frame DF.

[0018] The communication facility section 24 judges the communication end of data by reading that this continuation bit DL_a is "0." In this way, while being able to aim at power saving automatically by analyzing data and performing the display control of a display 21, operability improves.

[0019] Next, the 3rd gestalt of this invention is explained. Drawing 4 is the block diagram showing the concept of the function of the 3rd gestalt of this invention. The display 31 for displaying an alphabetic data and image data is formed in personal digital assistant equipment 30. It is a liquid crystal display and a display 31 is driven by the supply voltage from the electric power supply section 32 which consists of a battery etc. The manual display control unit 34 is the push button prepared as some keyboards, and when a user wants to display, a display command is made by pushing this manual display control unit 34. If a display command is made, the electric power supply control section 33 will be controlled to perform an electric power supply required for a display from the electric power supply section 32 to a display 31.

[0020] While the manual display control unit 34 is pushed, when power is made to supply to a display 31 from the electric power supply section 32 and a hand is lifted from the manual display control unit 34, only a cut or indispensable power makes an electric power supply supply [control section / electric power supply / 33] again. In addition, an indicative data on display is sent to a display 31 by the display-control function which is not illustrated.

[0021] On the other hand, the communication facility section 37 performs transmission and reception of other communication terminals and data through a cellular phone, PHS, a modem, etc. When it has the communication data analysis means and communication of data is performed, the communication facility section 37 analyzes the data, and judges a communicative end. About the analysis method of this data, it is almost the same as the 2nd gestalt, and is good. When the communication facility section 37 judges a communication end, it tells the notice judgment section 36 of voice about it. The notice judgment section 36 of voice which received the communication end of data drives the notice section 35 of voice which consists of a loudspeaker, a drive circuit, etc., and outputs voice or notice sound. This tells that communication of a displayable data was completed to a user.

[0022] By hearing the voice or notice sound of the notice section 35 of voice, a user can know that a display 31 is in the state which can be displayed. And the display by the display 31 is attained by pushing the manual display control unit 34 mentioned above.

[0023] Drawing 5 is a flow chart which shows the procedure of the electric power supply control to the display in the 3rd gestalt of this invention.

[S1] If it judges whether it is under communication now and is under communication, it will progress to Step S2, otherwise, will progress to Step S6.

[S2] The electric power supply to a display 31 is reduced or cut.

[S3] The data under communication are analyzed.

[S4] It judges whether it is a communication end, in the analysis of data, if it is an end, it will progress to Step S5, and if it is not an end, it will return to Step S3.

[S5] A user is told about a communication end with voice etc.

[S6] If it judges whether the button of a display command was pushed, and are pushed and it will not be progressed and pushed on Step S7, it returns to Step S1.

[S7] It displays on a display 31 by performing an electric power supply.

[S8] It judges whether the button of a display command was canceled, and if are canceled, and this flow chart will be ended and it will not be canceled, it returns to Step S7.

[0024] Thus, it can express as the timing which can reduce power consumption upwards and a user wishes by telling a user about the state which can be displayed to sound, and being made to perform a display command manually further.

[0025] In addition, with the 3rd gestalt, although the user was told about the state which can be displayed to sound, you may use vibration etc.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the concept of the function of the 1st gestalt of this invention.

[Drawing 2] It is the block diagram showing the concept of the function of the 2nd gestalt of this invention.

[Drawing 3] It is drawing showing the specification of the data transmission of PIAFS.

[Drawing 4] It is the block diagram showing the concept of the function of the 3rd gestalt of this invention.

[Drawing 5] It is the flow chart which shows the procedure of the electric power supply control to the display in the 3rd gestalt of this invention.

[Description of Notations]

10 [... Electric power supply section,] ... Personal digital assistant equipment, 11 ... A display, 12 13 [... Personal digital assistant equipment,] ... An electric power supply control section, 14 ... A manual display control unit, 20 21 [... Electric power supply control section,] ... A display, 22 ... The electric power supply section, 23 24 [... A display, 32 / ... The electric power supply section, 33 / ... An electric power supply control section, 34 / ... A manual display control unit, 35 / ... The notice section of voice 36 / ... The notice judgment section of voice, 37 / ... Communication facility section] ... The communication facility section, 30 ... Personal digital assistant equipment, 31

[Translation done.]

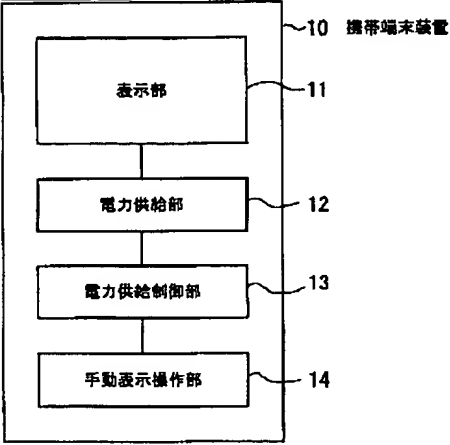
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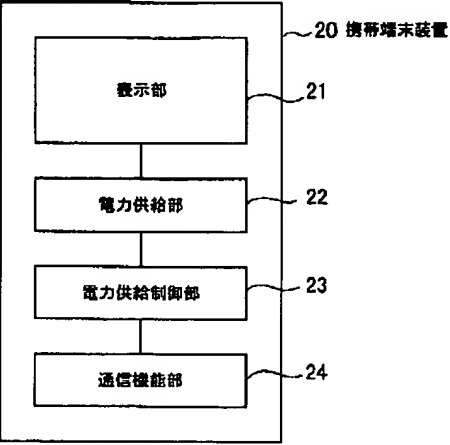
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DRAWINGS

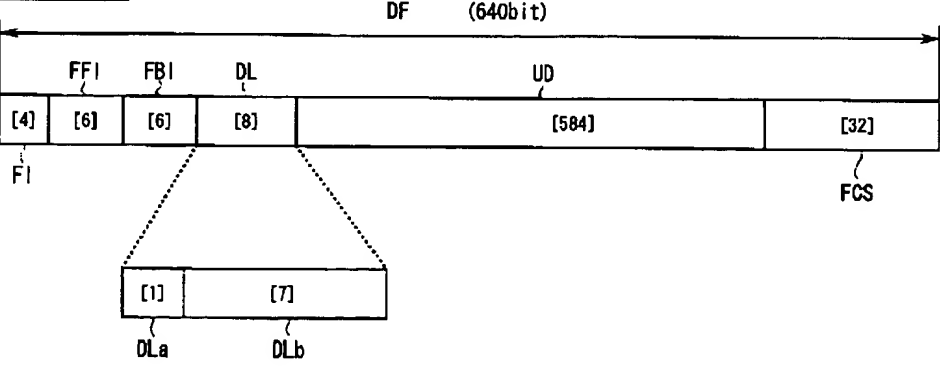
[Drawing 1]



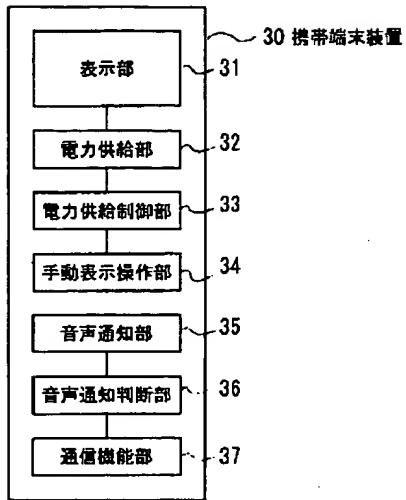
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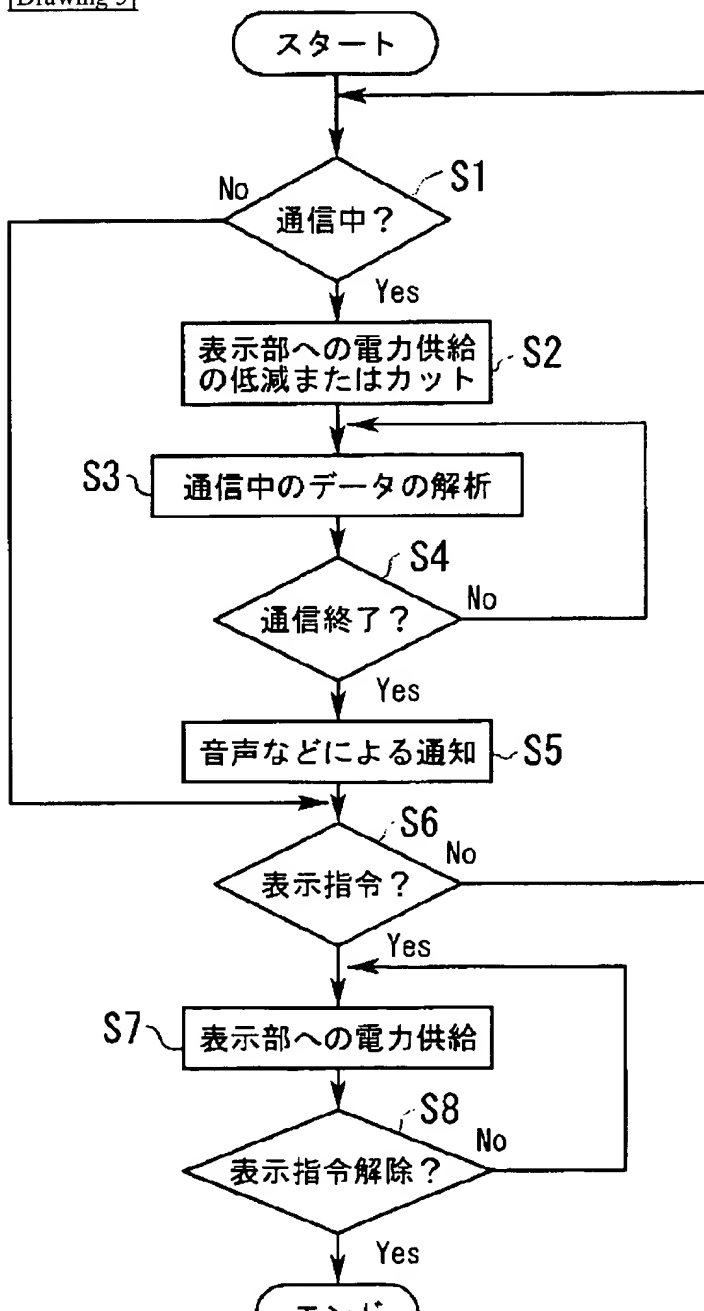
[Drawing 3]



[Drawing 4]



[Drawing 5]



PCL XL error

Subsystem: KERNEL

Error: IllegalOperatorSequence

Operator: SetColorSpace

Position: 638

PATENT ABSTRACTS OF JAPAN

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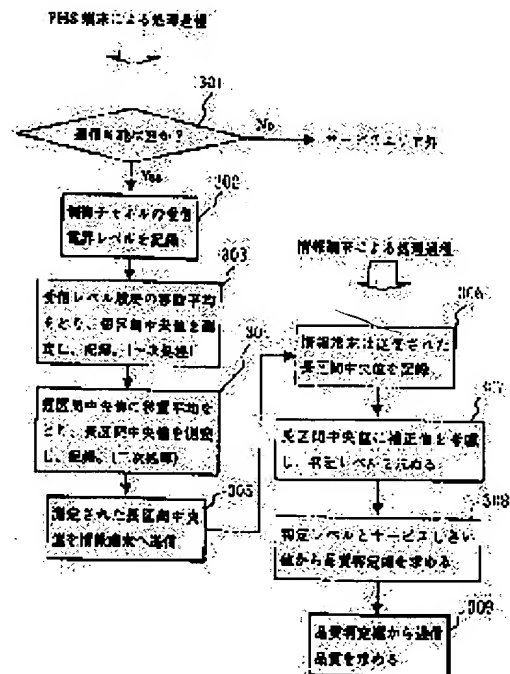
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(54) COMMUNICATION QUALITY DECISION SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain data communication services with a stable communication quality in a mobile communication system.

SOLUTION: This mobile communication system comprises a PHS terminal, a notebook-sized personal computer, a connection adapter of the PHS terminal and the notebook-sized personal computer and a base station connected to a cable network to performs duplex communications with the PHS terminal. In such a case, the PHS terminal is provided with a function (302) which measures the receiving field level of a control signal received from the base station by the PHS terminal and records it, functions (303 and 304) which perform statistic processing of the recorded receiving field level information and a function (305) which sends processed results to the notebook-sized personal computer, while the notebook-sized personal computer is provided with a function (306) which records the processed results sent from the PHS terminal and a function (309) which determines a communication quality by using the recorded processed results.



LEGAL STATUS

[Date of request for examination]

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] The communication quality judging method characterized by providing the following. Pocket machine. The information terminal connected with the pocket machine. The connection adapter of a pocket machine and an information terminal. In the mobile communications system which consists of base stations which performed a pocket machine and two-way communication and have been connected with the cable network the aforementioned pocket machine A means by which a pocket machine measures the received electric-field level of the control signal received from a base station, A means to record the measured this aforementioned received electric-field level, and the means which carries out statistics processing of the this recorded received electric-field level information, A means to record this processing result, and a means to judge communication quality using the this recorded processing result, Automatic in the received electric-field level by which record was carried out aforementioned], the aforementioned processing result, or the judged communication quality According to the demand from an information terminal, it has a means to transmit to an information terminal. or the aforementioned information terminal A means to record the aforementioned received electric-field level transmitted from the pocket machine, the aforementioned processing result, or the judged communication quality, A means to judge communication quality using this recorded processing result, the means which carries out statistics processing of the recorded aforementioned received electric-field level information, a means to record this processing result, and a means to judge communication quality using the this recorded processing result.

[Claim 2] The communication quality judging method according to claim 1 characterized by preparing a means to judge communication quality using the processing result by which record was carried out [aforementioned], and the means which carries out statistics processing of the aforementioned received electric-field level information by which record was carried out aforementioned] in either the aforementioned pocket machine or the aforementioned information terminal.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the communication quality judging method in a mobile communications system.

[0002]

[Description of the Prior Art] When performing data communication using a pocket machine and an information terminal, the timing of data transmission is dependent on whether a pocket machine is in the service area (within the circle) judged uniformly, or it is outside a service area (outside of the circle).

[0003] For example, as shown in drawing 1, the case where wireless data transmission is performed using a PHS terminal (Personal Handyphone System terminal), an information terminal, an interconnection cable, and an adapter is considered. The PHS terminal awaited, the control channel from a PHS base station was received in the inner (the power supply of a PHS terminal is on and communication is possible) state, and within the circle or the outside of the circle is uniformly judged by whether the momentary received electric-field level exceeded the communication service level threshold of PHS. Therefore, when received electric-field level rises and a communication service level threshold is also exceeded for a moment, it is judged that it is within the circle, and it is judged that it is data ready-for-sending ability. There is **** by which is in the middle of communication and forced release is carried out with PHS at this time since received electric field are changed by phasing and shadowing when data communication is automatically started with operation of a user or an information terminal. (Refer to drawing 2) The line disconnection in the middle of communication leads to battery waste of decline in frequency use efficiency, communication cost, a PHS terminal, and an information terminal etc.

[0004]

[Problem(s) to be Solved by the Invention] In a mobile communications system, the purpose of this invention is recording and processing the electric-field level of the signal which a pocket machine's receives, and is judging communication quality and offering stable data transmission services.

[0005] In the system, within the circle or the outside of the circle is conventionally judged uniformly by a PHS terminal awaiting by whether when it was inside, the control channel from a base station was received and the momentary received electric-field level exceeded the communication service level threshold of PHS. Therefore, when the PHS terminal was judged that communication is possible and data communication is automatically started with operation of a user or an information terminal, since received electric field are changed by phasing and shadowing, there is **** by which is in the middle of communication and forced release is carried out, and useless call origination may increase.

[0006] By attaining the above-mentioned purpose, this invention can avoid unstable communication which is in the middle of communication and will be cut, can offer stable data transmission services, and enables a deployment of the battery of curtailment of communication cost, a radio frequency or a PHS terminal, or an information terminal.

[0007]

[Means for Solving the Problem] this invention is characterized [main] by judging the communication quality of the situation that the pocket machine and the information terminal are placed by recording and processing the received electric-field level which a pocket machine receives at a pocket machine or an information terminal, and offering stable data transmission services.

[0008] Namely, the information terminal by which invention according to claim 1 was connected with the pocket machine and the pocket machine, In a pocket machine, the connection adapter of an information terminal, and the mobile communications system that consists of base stations which performed a pocket machine and two-way communication and have been connected with the cable network the aforementioned pocket machine A means by which a pocket machine measures the received electric-field level of the control signal received from a base station, A means to record the measured this aforementioned received electric-field level, and the means which carries out statistics processing of the this recorded received electric-field level information, A means to record this processing result, and a means to judge communication quality using the this recorded processing result, Automatic in the received electric-field level by which record was carried out [aforementioned], the aforementioned processing result, or the judged communication quality According to the demand from an information terminal, it has a means to transmit to an information terminal. or the aforementioned information terminal A means to record the aforementioned received electric-field level transmitted from the pocket machine, the aforementioned processing result, or the judged communication quality, It is characterized by having a means to judge communication quality using this recorded processing result, the means which carries out statistics processing of the recorded aforementioned received electric-field level

information, a means to record this processing result, and a means to judge communication quality using the this recorded processing result.

[0009]

[Embodiments of the Invention] The conceptual diagram of the example of use of the communication quality judging service by this invention is shown in drawing 1. Here, PHS is taken for an example as a radio communications system. PHS terminal 101 which has the function in which communication quality judging service performs measurement of received electric-field level, record, processing, and a communication quality judging as shown in drawing 1, The information transmitted from the demand of the information on a PHS terminal and the PHS terminal is recorded. It processes and the base station 104 of PHS which performs the adapter 103 which connects the information terminal 102 and PHS terminal which have the function to judge communication quality, and an information terminal, a PHS terminal, and two-way communication, and a base station consist of mobile communications networks 105 linked to the network of a cable. When saying that a PHS terminal is in the state which can be communicated, the state where a PHS terminal is in a service area and the power supply of a PHS terminal is on is shown. The operation gestalt by this invention is explained in detail henceforth.

[0010] In case communication quality performs data communication, it evaluates as an index the rate of job transmitting failure in what probability data communication fails. All the data transmitted by one communication shall be expressed as a job here. The service threshold level which can perform communication service is set to the radio communications system to the received electric-field level of a pocket machine. Received electric-field level of a pocket machine cannot communicate below by this service threshold level. this invention can estimate communication quality for the result which carried out statistics processing of the received electric-field level of the received signal as compared with a service threshold level.

[0011] The flow about the example 1 of a communication quality judging is shown in "example 1 of communication quality judging" drawing 3. It is the case where a PHS terminal performs multiple-times (here 2 times) processing for the received electric-field level of the control channel which a PHS terminal receives in the example 1 of a communication quality judging, and communication quality is judged at an information terminal. It states in detail below.

[0012] In drawing 1, when PHS terminal 101 is in the state which can be communicated (Step 301), PHS terminal 101 receives the control channel from a base station 104, and records the received electric-field level of a control signal (Step 302). Time to save the history of receiving level can be set up.

[0013] As primary statistics processing processing, the moving average (with no weighting) of the received electric-field level currently recorded is taken, and the result is recorded (Step 303). the sum of the received electric-field level which prepared two work memory for the moving averages, and was recorded on last time with this operation gestalt, and the received electric-field level recorded this time -- taking -- 2 -- **** -- a temporary statistics processing result is obtained by things With PHS, receiving level is accompanied by sharp instant change under the influence of phasing etc. By taking the moving average of a receiving level history, the primary treatment in PHS is performed in order to remove the above-mentioned instant change. The record obtained as a result of the primary treatment brings a measurement result of a short section median.

[0014] Since the short section median in PHS is accompanied by loose change under the influence of shadowing etc. as compared with instant change, it adds secondary statistics processing to short section median change further (Step 304). Secondary statistics processing is performed in order to reproduce long section median change by taking the moving average (with no weighting) of short section median change. While the PHS terminal records secondary statistics, a secondary statistics result is autonomously transmitted to an information terminal (Step 305).

[0015] An information terminal records the secondary statistics processing result transmitted from the PHS terminal (Step 306). Two elements are taken into consideration in order to determine communication quality. Blindness in one eye is the correction value of the measured long section median. By actual measurement, since it is difficult to calculate the median of receiving level, the average is used. Let level which lengthened correction value from the measured long section median be judgment level (Step 307). About correction value, it mentions later. The second is quality judging width of face. Quality judging width of face is the difference of judgment level and a service threshold level (Step 308). It can ask for communication quality with the value of quality judging width of face (Step 309). About quality judging width of face, it mentions later.

[0016] Even if a PHS terminal performs the primary above-mentioned statistics processing, secondary statistics processing, and a communication quality judging, an information terminal may perform them. Moreover, from a PHS terminal, the communication between a PHS terminal and an information terminal may transmit autonomously, and may be performed according to the demand to a PHS terminal from an information terminal. Therefore, the contents transmitted to an information terminal from a PHS terminal may be received electric-field level, and may be as a result of statistics processing, or may be the judged communication quality.

[0017] The flow about the example 2 of a communication quality judging is shown in "example 2 of communication quality judging" drawing 4. It is the case where a PHS terminal performs statistics processing for the received electric-field level of the control channel which a PHS terminal receives once in the example 2 of a communication quality judging, and communication quality is judged at an information terminal using the processing result.

[0018] In drawing 1, when PHS terminal 101 is in the state which can be communicated (Step 401), PHS terminal 101 receives the control channel from a base station 104, and records the received electric-field level of a control signal (Step 402). Time to save the history of receiving level can be set up.

[0019] The moving average which attached the weight of the received electric-field level currently recorded is taken, and the result is recorded (Step 403). How to attach weight is mentioned later. The obtained result reproduces a long section median. A statistics processing result is transmitted to an information terminal automatically [a PHS terminal] and periodically (Step 404).

[0020] An information terminal records the processing result transmitted from the PHS terminal (Step 405). Communication quality is judged by lengthening correction value from the measured long section median like "the example 1 of a communication quality judging", asking for judgment level (Step 406), and asking for quality judging width of face from judgment level (Steps 407-408).

[0021] Even if a PHS terminal performs the above-mentioned statistics processing and a communication quality judging, an information terminal may perform them. Moreover, from a PHS terminal, the communication between a PHS terminal and an information terminal may transmit automatically, and may be performed according to the demand to a PHS terminal from an information terminal.

[0022] The flow about the example of communication quality judging use is shown in "example of communication quality judging use" drawing 5. The case where a user performs data communication using PHS and Note PC (note type personal computer) is considered. The communication quality demanded changes with the data size which it is going to transmit, and degrees of urgency. For example, if it is in the state which can be communicated when there is demand of wanting to perform data transmission from a user in a certain communication quality to application (Step 501), data transmit timing can be determined using the function of a communication quality judging. It asks for quality judging width of face required for reverse from communication quality with the demand. The level which applied quality judging width of face to the service threshold level is judgment level (Step 502). That is, if the level which lengthened correction value from the measured long section median is (Step 503) and more than this judgment level (Step 504), it can be judged that data transmission is possible in the demanded communication quality (Step 505).

[0023] On the other hand, if it is not more than judgment level (Step 504), in the demanded communication quality, it can be judged that data transmission is impossible (Step 507). When a setup the communication quality below a demand also carries out [a setup] data transmission in this case is made, data transmission is performed (Step 508), and when that is not right, processing which judges whether the level which amended to the long section median measured again is more than judgment level can be performed (Step 504).

[0024] - The correction value of a long section median is calculated as follows about the correction value of a long section median. When the probability density function of long section median change is set to $P(t, L)$, a correction factor is expressed as follows. A correction factor is probability included within limits as which the measured long section median considered correction value to the long section median which should originally be obtained. Here, t is [received electric-field level (dB) and L_c of time (second) and L] long section medians.

[0025]

[Equation 1]

$$\text{補正率} [\%] = \int_{L_c - \Delta L}^{L_c + \Delta L} \int_{t_0}^{\infty} P(t, L) dL dt \quad \dots \quad (1)$$

[0026] A communication quality judging is influenced by the correction factor. **L will be decided if a correction factor is set up. The value of this **L is used as correction value.

[0027] When the instant change by phasing generally considers use by walking speed according to a Rayleigh distribution with PHS, the Doppler frequency is about 10Hz. Moreover, according to a log normal distribution, the Doppler frequency of short section median change is about [of instant change] 1/100. The example using this invention method is shown in drawing 6 to this model. It is the distribution of the long section median (measured value) to which drawing 6 took time (second) along the horizontal axis, and took relative receiving level along the vertical axis. When calculating the long section median of drawing 6, the method of "the example 1 of a communication quality judging" was used. A related parameter is shown in Table 1. Time [to take the moving average of a primary treatment] width of face is $T_1 = 4T$ (in PHS, it is $T = 1.2$ seconds.). It considered as refer to the table. Moreover, the parameter K at the time of calculating a long section median is defined. K is equivalent to the periodicity of short section median change to equalize, and when the change office wave number of T_2 and a short section median is expressed for time [to take the moving average of secondary statistics processing] width of face as f , the parameter K at the time of calculating a long section median is expressed with the following formulas.

[0028] $K = T_2 \times f$ [0029] Drawing 6 is shown about the case of $K = 6$. The result which asked for the relation between the correction factor of (1) formula and **L (correction value) is shown in drawing 7 using the distribution of drawing 6. Drawing 7 showed the case of $K = 3$, and 6 and 12. When a correction factor is made into 90% from drawing 7, for example, correction value is calculated with about 5.4dB.

[0030]

[Table 1]

瞬時値変動	Rayleigh fading ($f_d=10\text{Hz}$)
短区間中央値変動	Log-Normal ($\sigma = 6\text{dB}$)
PHS 端末の制御チャネル受信間隔	T (=1.2 sec.)
Tch 劣化から通信切断までの時間	6T
短区間中央値測定時の測定時間	4T

[0031] - Since PHS is considered that the received electric-field level variation actually sensed is close to short section median change about quality judging width of face, ask for the relation between short section median change and the rate of job transmitting failure. Since it is assumed that PHS is used during quiescence or a walk, the short section median change with a fixed long section median is considered. In this case, quality judging width of face is the difference of a long section median and a service threshold level. The parameter relevant to drawing 6 for the distribution of the above-mentioned short section median change is shown in Table 1. It considers performing job transmission in the above-mentioned model. The above-mentioned short section median change searches for the probability which is less than a service threshold level. When forced release of the communication is not necessarily carried out as a point taken into consideration the moment received electric-field level turned into below the service threshold level in PHS, there is a function to look for a channel with more high level and another channel is not found, it is the feature of becoming forced release. Therefore, as conditions which ask for the rate of job transmitting failure, when the received electric-field level of a PHS terminal was less than a service threshold level more than continuation 6T (refer to table), it considered as forced release, and it presupposed that it is job transmitting failure. When the probability density function of short section median change is set to S (t, L), the rate of job transmitting failure can be expressed as follows. Here, t is [received electric-field level (dB) and Lth of time (second) and L] service threshold levels.

[0032]

[Equation 2]

$$\text{ジョブ送信失敗率} [\%] = \int_{t=0}^{\infty} \int_{L=-\infty}^{L_{th}} S(t, L) dL dt \Big|_{S(t, L) < L_{th} \text{連続} 6T \text{以上}}$$

[0033] It depends for the rate of job transmitting failure on quality judging width of face. The relation between the rate of job transmitting failure for which it asked from the above-mentioned model, and quality judging width of face is shown in drawing 8. The job size transmitted here was expressed with the total time concerning communication, and showed the case of 6T. From drawing 8, when for example, quality judging width of face is 11dB, the rate of job transmitting failure is called for with 12%.

[0034] - Data communication is the index by what probability communication quality is successful about communication quality, and take the value between 0 and 1. Communication quality is called for as follows from a correction factor and the rate of job transmitting failure.

[0035] Communication quality = 100x [correction factor [%] /] (rate of 1-job transmitting failure [%])/100 [0036] For example, it is [0037] when the aforementioned numeric value is used. Communication quality = 90/100x (100-12) / 100 = 0.79 [0038] It can be said by the next door and 79.2% (about 80%) of probability that data communication is possible.

[0039] - Perform statistics processing by the method shown in the following formula using the received electric-field level record result of the M past about the weight of the moving average in "the example 2 of a communication quality judging."

[0040] $E(L) = \sum_{i=1}^M a_i \cdot D_{i-1} = a_M \cdot i + 1 = i = 1, 2, \dots, M/2$ (counting fractions as one)

[0041] For example, the weight is as follows when the data which take an average are arranged in seven time orders (D1-D7).

[0042]

[Equation 3]

データ	D1	D2	D3	D4	D5	D6	D7
重み	1	2	3	4	3	2	1
	→ 時間						

[0043] It is "the example 2 of a communication quality judging which took the moving average by such weighting method."

[0044]

[Effect of the Invention] In the wireless-data-transmission service using a pocket machine and the end of *****, communication quality can be judged by carrying out statistics processing of the information which recorded the received electric-field level of a pocket machine, and was recorded at the pocket machine or the information terminal. What is necessary is just not to newly build a system and to add a communication quality judging service function to a pocket machine, an information terminal, and a connection adapter in this invention. It becomes possible to avoid the situation that forced release of the communication will be carried out during data communication in wireless data transmission by this invention, as much as possible, and offer of the wireless-data-transmission service with the stable high reliability is attained. Moreover, it is possible to also raise a deployment of a radio frequency, curtailment of communication cost, or the use efficiency of a pocket machine or the battery in the end of

*****. From a user, it is also still more possible to give the error criterion of the unclear radio quality.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the communication quality judging method in a mobile communications system.

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PRIOR ART

[Description of the Prior Art] When performing data communication using a pocket machine and an information terminal, the timing of data transmission is dependent on whether a pocket machine is in the service area (within the circle) judged uniformly, or it is outside a service area (outside of the circle).

[0003] For example, as shown in drawing 1, the case where wireless data transmission is performed using a PHS terminal (Personal Handyphone System terminal), an information terminal, an interconnection cable, and an adapter is considered. The PHS terminal awaited, the control channel from a PHS base station was received in the inner (the power supply of a PHS terminal is on and communication is possible) state, and within the circle or the outside of the circle is uniformly judged by whether the momentary received electric-field level exceeded the communication service level threshold of PHS. Therefore, when received electric-field level rises and a communication service level threshold is also exceeded for a moment, it is judged that it is within the circle, and it is judged that it is data ready-for-sending ability. There is **** by which is in the middle of communication and forced release is carried out with PHS at this time since received electric field are changed by phasing and shadowing when data communication is automatically started with operation of a user or an information terminal. (Refer to drawing 2) The line disconnection in the middle of communication leads to battery waste of decline in frequency use efficiency, communication cost, a PHS terminal, and an information terminal etc.

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EFFECT OF THE INVENTION

[Effect of the Invention] In the wireless-data-transmission service using a pocket machine and the end of *****, communication quality can be judged by carrying out statistics processing of the information which recorded the received electric-field level of a pocket machine, and was recorded at the pocket machine or the information terminal. What is necessary is just not to newly build a system and to add a communication quality judging service function to a pocket machine, an information terminal, and a connection adapter in this invention. It becomes possible to avoid the situation that forced release of the communication will be carried out during data communication in wireless data transmission by this invention, as much as possible, and offer of the wireless-data-transmission service with the stable high reliability is attained. Moreover, it is possible to also raise a deployment of a radio frequency, curtailment of communication cost, or the use efficiency of a pocket machine or the battery in the end of *****. From a user, it is also still more possible to give the error criterion of the unclear radio quality.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In a mobile communications system, the purpose of this invention is recording and processing the electric-field level of the signal which a pocket machine's receives, and is judging communication quality and offering stable data transmission services.

[0005] In the system, within the circle or the outside of the circle is conventionally judged uniformly by a PHS terminal awaiting by whether when it was inside, the control channel from a base station was received and the momentary received electric-field level exceeded the communication service level threshold of PHS. Therefore, when the PHS terminal was judged that communication is possible and data communication is automatically started with operation of a user or an information terminal, since received electric field are changed by phasing and shadowing, there is **** by which is in the middle of communication and forced release is carried out, and useless call origination may increase.

[0006] By attaining the above-mentioned purpose, this invention can avoid unstable communication which is in the middle of communication and will be cut, can offer stable data transmission services, and enables a deployment of the battery of curtailment of communication cost, a radio frequency or a PHS terminal, or an information terminal.

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MEANS

[Means for Solving the Problem] this invention is characterized [main] by judging the communication quality of the situation that the pocket machine and the information terminal are placed by recording and processing the received electric-field level which a pocket machine receives at a pocket machine or an information terminal, and offering stable data transmission services. [0008] Namely, the information terminal by which invention according to claim 1 was connected with the pocket machine and the pocket machine, In a pocket machine, the connection adapter of an information terminal, and the mobile communications system that consists of base stations which performed a pocket machine and two-way communication and have been connected with the cable network the aforementioned pocket machine A means by which a pocket machine measures the received electric-field level of the control signal received from a base station, A means to record the measured this aforementioned received electric-field level, and the means which carries out statistics processing of the this recorded received electric-field level information, A means to record this processing result, and a means to judge communication quality using the this recorded processing result, Automatic in the received electric-field level by which record was carried out [aforementioned], the aforementioned processing result, or the judged communication quality According to the demand from an information terminal, it has a means to transmit to an information terminal. or the aforementioned information terminal A means to record the aforementioned received electric-field level transmitted from the pocket machine, the aforementioned processing result, or the judged communication quality, It is characterized by having a means to judge communication quality using this recorded processing result, the means which carries out statistics processing of the recorded aforementioned received electric-field level information, a means to record this processing result, and a means to judge communication quality using the this recorded processing result.

[0009]

[Embodiments of the Invention] The conceptual diagram of the example of use of the communication quality judging service by this invention is shown in drawing 1 . Here, PHS is taken for an example as a radio communications system. PHS terminal 101 which has the function in which communication quality judging service performs measurement of received electric-field level, record, processing, and a communication quality judging as shown in drawing 1 , The information transmitted from the demand of the information on a PHS terminal and the PHS terminal is recorded. It processes and the base station 104 of PHS which performs the adapter 103 which connects the information terminal 102 and PHS terminal which have the function to judge communication quality, and an information terminal, a PHS terminal, and two-way communication, and a base station consist of mobile communications networks 105 linked to the network of a cable. When saying that a PHS terminal is in the state which can be communicated, the state where a PHS terminal is in a service area and the power supply of a PHS terminal is on is shown. The operation gestalt by this invention is explained in detail henceforth.

[0010] In case communication quality performs data communication, it evaluates as an index the rate of job transmitting failure in what probability data communication fails. All the data transmitted by one communication shall be expressed as a job here. The service threshold level which can perform communication service is set to the radio communications system to the received electric-field level of a pocket machine. Received electric-field level of a pocket machine cannot communicate below by this service threshold level. this invention can estimate communication quality for the result which carried out statistics processing of the received electric-field level of the received signal as compared with a service threshold level.

[0011] The flow about the example 1 of a communication quality judging is shown in "example 1 of communication quality judging" drawing 3 . It is the case where a PHS terminal performs multiple-times (here 2 times) processing for the received electric-field level of the control channel which a PHS terminal receives in the example 1 of a communication quality judging, and communication quality is judged at an information terminal. It states in detail below.

[0012] In drawing 1 , when PHS terminal 101 is in the state which can be communicated (Step 301), PHS terminal 101 receives the control channel from a base station 104, and records the received electric-field level of a control signal (Step 302). Time to save the history of receiving level can be set up.

[0013] As primary statistics processing processing, the moving average (with no weighting) of the received electric-field level currently recorded is taken, and the result is recorded (Step 303). the sum of the received electric-field level which prepared two work memory for the moving averages, and was recorded on last time with this operation gestalt, and the received electric-field level recorded this time -- taking -- 2 -- **** -- a temporary statistics processing result is obtained by things With PHS, receiving level is accompanied by sharp instant change under the influence of phasing etc. By taking the moving average of a receiving level history, the primary treatment in PHS is performed in order to remove the above-mentioned instant change. The record obtained as a result of the primary treatment brings a measurement result of a short section median.

[0014] Since the short section median in PHS is accompanied by loose change under the influence of shadowing etc. as compared with instant change, it adds secondary statistics processing to short section median change further (Step 304). Secondary statistics processing is performed in order to reproduce long section median change by taking the moving average (with no weighting) of short section median change. While the PHS terminal records secondary statistics, a secondary statistics result is autonomously transmitted to an information terminal (Step 305).

[0015] An information terminal records the secondary statistics processing result transmitted from the PHS terminal (Step 306). Two elements are taken into consideration in order to determine communication quality. Blindness in one eye is the correction value of the measured long section median. By actual measurement, since it is difficult to calculate the median of receiving level, the average is used. Let level which lengthened correction value from the measured long section median be judgment level (Step 307). About correction value, it mentions later. The second is quality judging width of face. Quality judging width of face is the difference of judgment level and a service threshold level (Step 308). It can ask for communication quality with the value of quality judging width of face (Step 309). About quality judging width of face, it mentions later.

[0016] Even if a PHS terminal performs the primary above-mentioned statistics processing, secondary statistics processing, and a communication quality judging, an information terminal may perform them. Moreover, from a PHS terminal, the communication between a PHS terminal and an information terminal may transmit autonomously, and may be performed according to the demand to a PHS terminal from an information terminal. Therefore, the content transmitted to an information terminal from a PHS terminal may be received electric-field level, and may be as a result of statistics processing, or may be the judged communication quality.

[0017] The flow about the example 2 of a communication quality judging is shown in "example 2 of communication quality judging" drawing 4. It is the case where a PHS terminal performs statistics processing for the received electric-field level of the control channel which a PHS terminal receives once in the example 2 of a communication quality judging, and communication quality is judged at an information terminal using the processing result.

[0018] In drawing 1, when PHS terminal 101 is in the state which can be communicated (Step 401), PHS terminal 101 receives the control channel from a base station 104, and records the received electric-field level of a control signal (Step 402). Time to save the history of receiving level can be set up.

[0019] The moving average which attached the weight of the received electric-field level currently recorded is taken, and the result is recorded (Step 403). How to attach weight is mentioned later. The obtained result reproduces a long section median. A statistics processing result is transmitted to an information terminal automatically [a PHS terminal] and periodically (Step 404).

[0020] An information terminal records the processing result transmitted from the PHS terminal (Step 405). Communication quality is judged by lengthening correction value from the measured long section median like "the example 1 of a communication quality judging", asking for judgment level (Step 406), and asking for quality judging width of face from judgment level (Steps 407-408).

[0021] Even if a PHS terminal performs the above-mentioned statistics processing and a communication quality judging, an information terminal may perform them. Moreover, from a PHS terminal, the communication between a PHS terminal and an information terminal may transmit automatically, and may be performed according to the demand to a PHS terminal from an information terminal.

[0022] The flow about the example of communication quality judging use is shown in "example of communication quality judging use" drawing 5. The case where a user performs data communication using PHS and Note PC (note type personal computer) is considered. The communication quality demanded changes with the data size which it is going to transmit, and degrees of urgency. For example, if it is in the state which can be communicated when there is demand of wanting to perform data transmission from a user in a certain communication quality to application (Step 501), data transmit timing can be determined using the function of a communication quality judging. It asks for quality judging width of face required for reverse from communication quality with the demand. The level which applied quality judging width of face to the service threshold level is judgment level (Step 502). That is, if the level which lengthened correction value from the measured long section median is (Step 503) and more than this judgment level (Step 504), it can be judged that data transmission is possible in the demanded communication quality (Step 505).

[0023] On the other hand, if it is not more than judgment level (Step 504), in the demanded communication quality, it can be judged that data transmission is impossible (Step 507). When a setup the communication quality below a demand also carries out [a setup] data transmission in this case is made, data transmission is performed (Step 508), and when that is not right, processing which judges whether the level which amended to the long section median measured again is more than judgment level can be performed (Step 504).

[0024] - The correction value of a long section median is calculated as follows about the correction value of a long section median. When the probability density function of long section median change is set to $P(t, L)$, a correction factor is expressed as follows. A correction factor is probability included within limits as which the measured long section median considered correction value to the long section median which should originally be obtained. Here, t is [received electric-field level (dB) and L_c of time (second) and L] long section medians.

[0025]

[Equation 1]

$$\text{補正率} [\%] = \int_{t0}^{\infty} \int_{L_c - \Delta L}^{L_c + \Delta L} P(t, L) dL dt \quad \dots\dots (1)$$

[0026] A communication quality judging is influenced by the correction factor. **L will be decided if a correction factor is set up. The value of this **L is used as correction value.

[0027] When the instant change by phasing generally considers use by walking speed according to a Rayleigh distribution with PHS, the Doppler frequency is about 10Hz. Moreover, according to a log normal distribution, the Doppler frequency of short section median change is about [of instant change] 1/100. The example using this invention method is shown in drawing 6 to this model. It is the distribution of the long section median (measured value) to which drawing 6 took time (second) along the horizontal axis, and took relative receiving level along the vertical axis. When calculating the long section median of drawing 6, the method of "the example 1 of a communication quality judging" was used. A related parameter is shown in Table 1. Time [to take the moving average of a primary treatment] width of face is T1=4T (in PHS, it is T= 1.2 seconds.). It considered as refer to the table. Moreover, the parameter K at the time of calculating a long section median is defined. K is equivalent to the periodicity of short section median change to equalize, and when the change office wave number of T2 and a short section median is expressed for time [to take the moving average of secondary statistics processing] width of face as f, the parameter K at the time of calculating a long section median is expressed with the following formulas.

[0028] $K=T2xf$ [0029] Drawing 6 is shown about the case of K= 6. The result which asked for the relation between the correction factor of (1) formula and **L (correction value) is shown in drawing 7 using the distribution of drawing 6. Drawing 7 showed the case of K= 3, and 6 and 12. When a correction factor is made into 90% from drawing 7, for example, correction value is calculated with about 5.4dB.

[0030]

[Table 1]

瞬時値変動	Rayleigh fading ($f_d=10\text{Hz}$)
短区間中央値変動	Log-Normal ($\sigma = 6\text{dB}$)
PHS 端末の制御チャネル受信間隔	T (=1.2 sec.)
Tch 劣化から通信切断までの時間	6T
短区間中央値測定時の測定時間	4T

[0031] - Since PHS is considered that the received electric-field level variation actually sensed is close to short section median change about quality judging width of face, ask for the relation between short section median change and the rate of job transmitting failure. Since it is assumed that PHS is used during quiescence or a walk, the short section median change with a fixed long section median is considered. In this case, quality judging width of face is the difference of a long section median and a service threshold level. The parameter relevant to drawing 6 for the distribution of the above-mentioned short section median change is shown in Table 1. It considers performing job transmission in the above-mentioned model. The above-mentioned short section median change searches for the probability which is less than a service threshold level. When forced release of the communication is not necessarily carried out as a point taken into consideration the moment received electric-field level turned into below the service threshold level in PHS, there is a function to look for a channel with more high level and another channel is not found, it is the feature of becoming forced release. Therefore, as conditions which ask for the rate of job transmitting failure, when the received electric-field level of a PHS terminal was less than a service threshold level more than continuation 6T (refer to table), it considered as forced release, and it presupposed that it is job transmitting failure. When the probability density function of short section median change is set to S (t, L), the rate of job transmitting failure can be expressed as follows. Here, t is [received electric-field level (dB) and Lth of time (second) and L] service threshold levels.

[0032]

[Equation 2]

$$\text{ジョブ送信失敗率} [\%] = \int_{t0}^{\infty} \int_{-\infty}^{Lth} S(t, L) dL dt \quad | \quad S(t, L) < Lth \text{連続} 6T \text{以上}$$

[0033] It depends for the rate of job transmitting failure on quality judging width of face. The relation between the rate of job transmitting failure for which it asked from the above-mentioned model, and quality judging width of face is shown in drawing 8. The job size transmitted here was expressed with the total time concerning communication, and showed the case of 6T. From drawing 8, when for example, quality judging width of face is 11dB, the rate of job transmitting failure is called for with 12%.

[0034] - Data communication is the index by what probability communication quality is successful about communication quality,

and take the value between 0 and 1. Communication quality is called for as follows from a correction factor and the rate of job transmitting failure.

[0035] Communication quality = $100 \times [\text{correction factor } \%] / [\text{rate of 1-job transmitting failure } \%]$ [0036] For example, it is [0037] when the aforementioned numeric value is used. Communication quality = $90 / 100 \times (100 - 12) / 100 = 0.79$ [0038] It can be said by the next door and 79.2% (about 80%) of probability that data communication is possible.

[0039] - Perform statistics processing by the method shown in the following formula using the received electric-field level record result of the M past about the weight of the moving average in "the example 2 of a communication quality judging."


[0040] $E(L) = \sum_{i=1}^M D_i a_i = a_{M-i+1} = i = 1, 2, \dots, M/2$ (counting fractions as one)

[0041] For example, the weight is as follows when the data which take an average are arranged in seven time orders (D1-D7).

[0042]

[Equation 3]

データ	D1	D2	D3	D4	D5	D6	D7
重み	1	2	3	4	3	2	1



[0043] It is "the example 2 of a communication quality judging which took the moving average by such weighting method."

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the example of a system using communication quality judging service.

[Drawing 2] It is an image view in case forced release arises during communication.

[Drawing 3] It is drawing showing the flow about the example 1 of a communication quality judging by this invention.

[Drawing 4] It is drawing showing the flow about the example 2 of a communication quality judging by this invention.

[Drawing 5] It is drawing showing the flow about the example of communication quality judging use by this invention.

[Drawing 6] It is the image view of the time distribution of the short section median by this invention, and a long section median and correction value, and quality judging width of face.

[Drawing 7] It is drawing showing the correction value pair correction factor distribution by this invention.

[Drawing 8] It is drawing showing the rate distribution of quality judging **** job transmitting failure by this invention.

[Description of Notations]

101: PHS terminal

102: Information terminal

103: The connection adapter of a PHS terminal and an information terminal

104: The base station of PHS

105: Mobile communications network

[Translation done.]

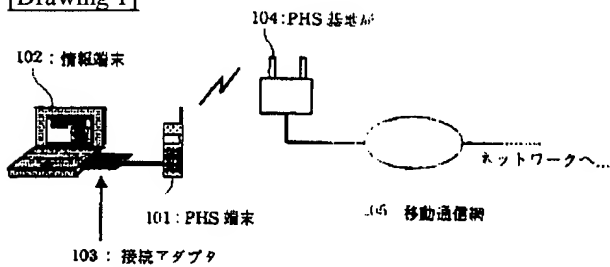
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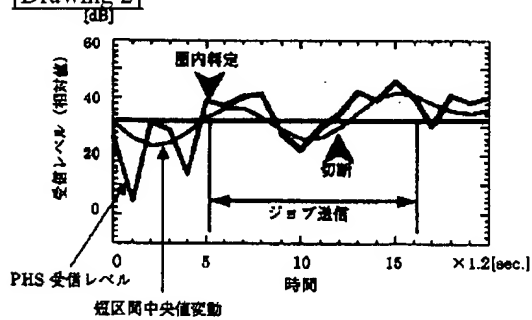
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DRAWINGS

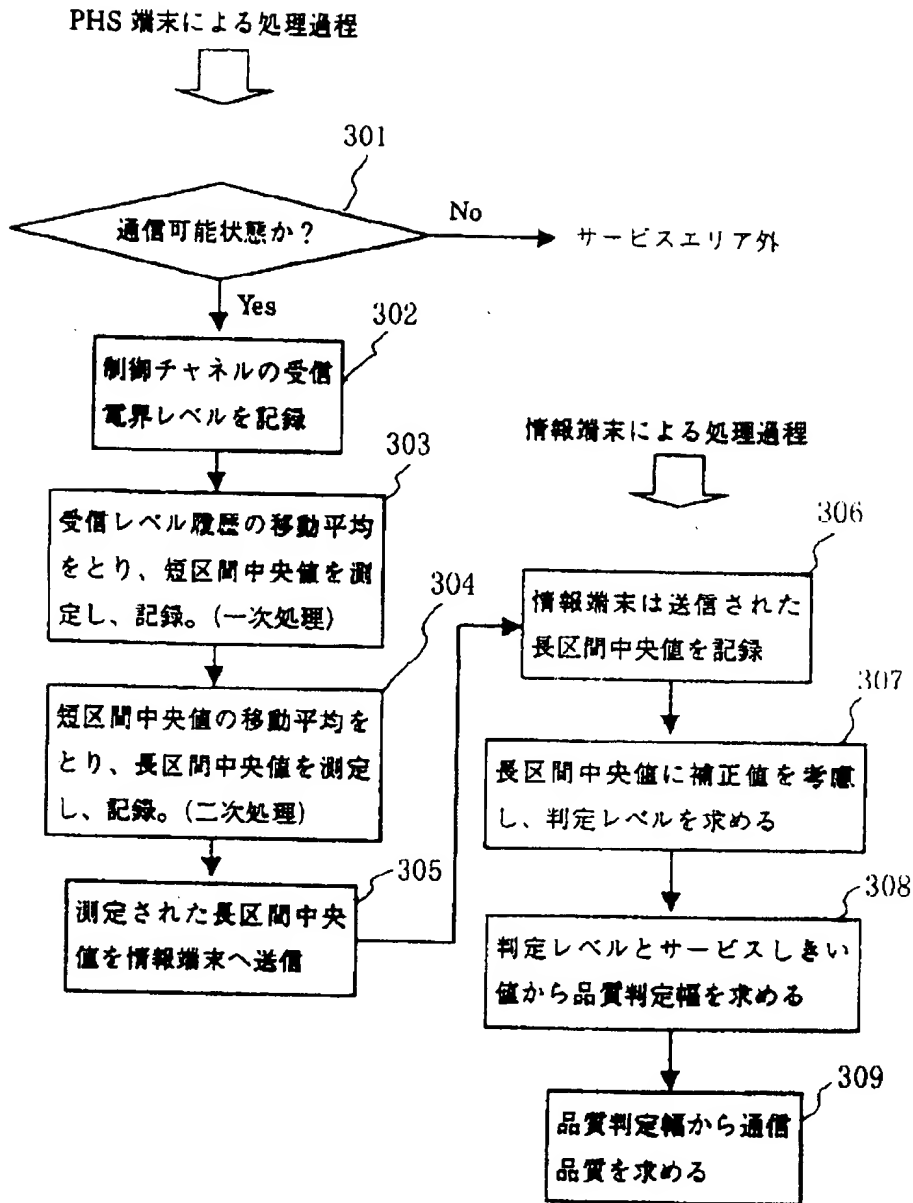
[Drawing 1]



[Drawing 2]

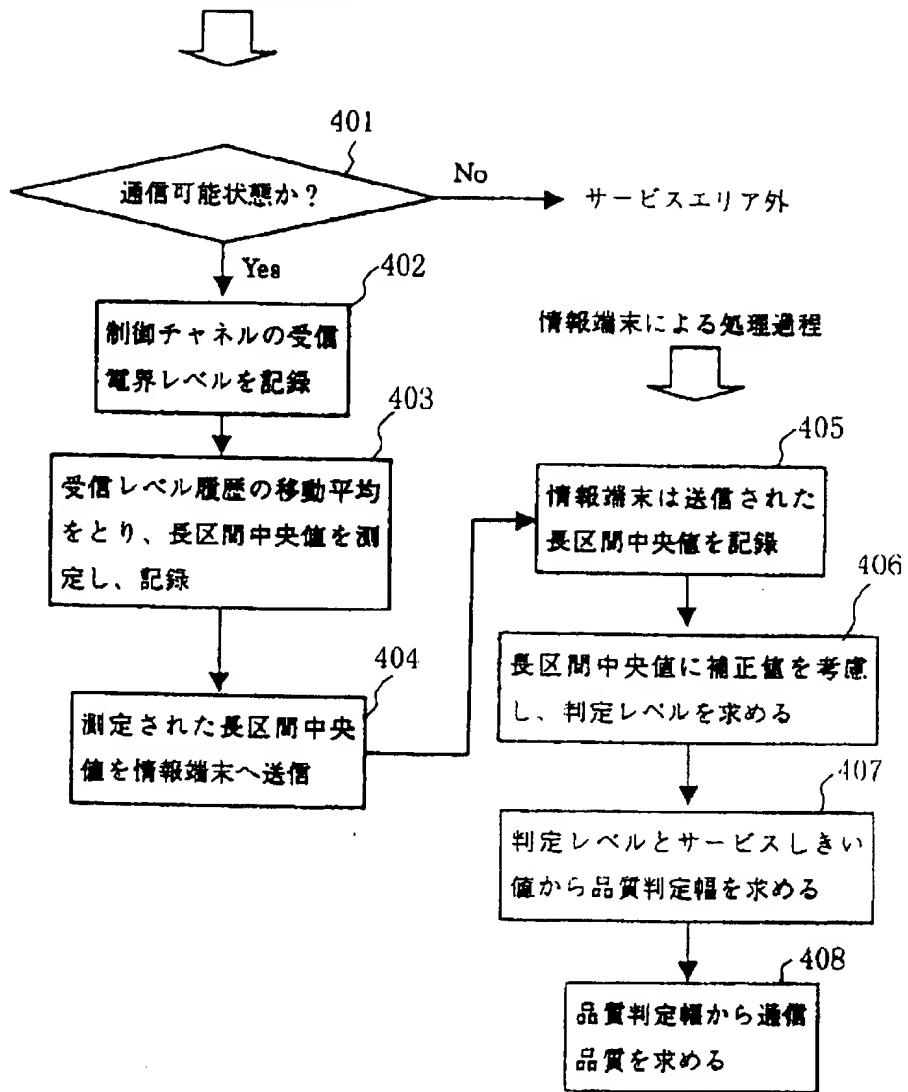


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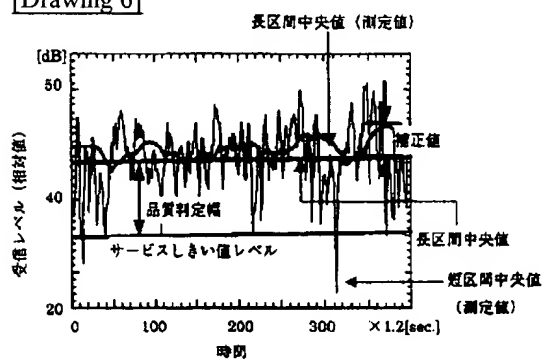


[Drawing 4]

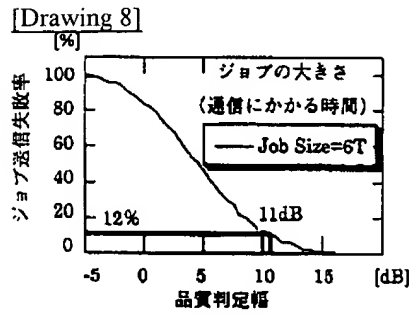
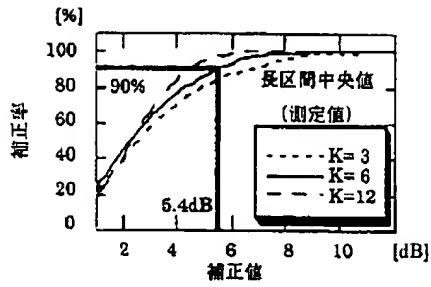
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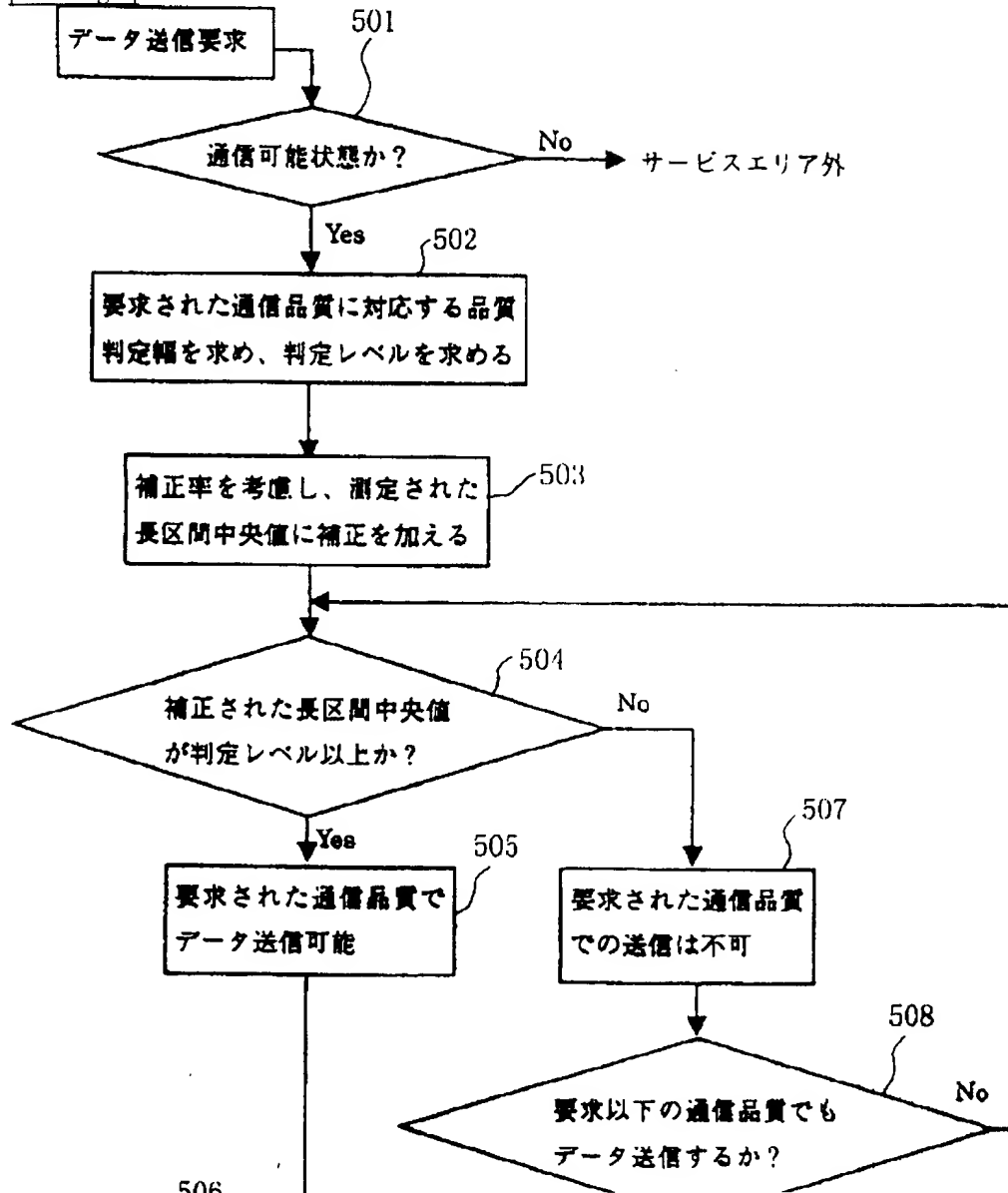
[Drawing 6]



[Drawing 7]



[Drawing 5]



PCL XL error

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